S/S 11 – Architecture + Fashion

Queenie W.S. Leung
Fall 2010

Submitted towards the fulfillment of the requirements for the Doctor of Architecture Degree.

School of Architecture
University of Hawai‘i

Doctorate Project Committee

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We certify that we have read this Doctorate Project and that, in our opinion, it is satisfactory in scope and quality in fulfillment as a Doctorate Project for the degree of Doctor of Architecture in the School of Architecture, University of Hawai'i at Mānoa.

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Contents

Abstract:

The relationship between architecture and fashion reflects many commonalities in terms of designs and techniques. Fashion designers have been appropriating architectonic elements into garments. Yet, architects are gradually applying fashion elements into building forms. This interface could give people a different perspective on permanent building. It is true that architecture is not as flexible as fashion in changeability. However, in reality, buildings *can* and will always be changing.

The purpose of this research project is to propose a design model that can be changeable and transformable, applied to traditional housing. Through historical research and analysis, fashion principle exploration, and design modeling to develop a new form of architecture, our perspective of permanent housing will be changed and we can enjoy flexible exterior and interior transformations.

1.0 Introduction

1.1 Parallel Study of Fashion and Architecture

Can a building change its clothes?

Parallel studies in architecture and fashion is a growing topic in both fields. It is more common to note that garments have been constructed in an architectonic way. However, architecture is still on its way to adapting the techniques in fashion design.

Fashion design has developed into an important industry in present society. It is true that clothing has gone beyond its primary purposes as body protection, adaptability for changes of weather, as well as the preferences of traditional culture and religion. Currently, fashion is ever changing in short intervals; and a variety of seasonal clothing styles are offered concurrently. Indeed, people have many choices on a wide range of clothing in various styles and colors according to each individual's taste and preference. Moreover, a person's clothing selection can also directly reflect their character and style, and provide an impression that they want to present to others.

In architecture, buildings are more long-lasting and provide people with a sense of permanence and strength. Once a building is built, it is not easy to modify it to keep up with new trends or to make changes according to the owner's wishes. In this regard, fashion design and architectural design do not seem to be correlated with each other, yet, they both serve the similar purpose of providing human shelter and bodily protection. The main distinction between fashion design and architectural design is that clothing *can* have more flexibility and building is restricted by its complexity.

The development of the past centuries indicates that the style of building design and clothing design were mostly affected by cultural, environmental and economic elements. At the very beginning, human beings learned to wear animal skins to keep warm and made their shelter in caves to satisfy their basic needs. Gradually, people wore more classical and decoratively designed garments; classical buildings were also developed to satisfy the human sense of design. In the 19th century, the modernist favored the theory of "Less is more", and at present, the theory of "deconstructionism" has gained popularity. Thus, the evolution of design of clothing

and architecture has reflected the concurrent demands of human culture, social environment as well as the phenomenon of weather and climate changes.

Most of the buildings in the past were confined to function rather than form. Indeed, it is not easy to change the façade of existing buildings as compared with clothing. The reason for the fast changing clothing fashion is caused by the rapid change of people's taste and interest in clothing. On the other hand, it is also people's desire to change and improve their existing living and work environment. Nevertheless, the huge sum of renovation costs for the exterior or interior of a building has often discouraged them to make such investments.

The perception that building is hard to change is partially true, but it is changeable and it's actually changing over time. All buildings are changing over time to adapt with changing surroundings and physical deterioration. Commercial buildings are the most common building type that undergoes periodic modernization in order to remain competitive in the rental market; most buildings themselves change only minimally during their lifetime.

Architectural design has been applied to garment fashion and architects have adopted certain fashion techniques and vocabularies of the fashion world. While I was doing a practicum on architecture practice in New York for half a year I had an opportunity to visit different types of stores and to explore their designs, materials used and the use of space within the stores. Each of these stores has its own architectural elements in respect to the material used, lighting system, movement circulation, and spatial transformation—all which integrate with fashion design.

2.0 Project Statement

2.1 Project Statement

This D.Arch project focuses on how the principles of fashion can be applied to a design model that offers transformation and changeability for residential retreats with simple structure and flexible form.

Based on the principles of fashion—wrapping, folding, and transformation—a variety of design techniques were studied in search of a form, structure, or system which could be changed and transformed to a design model that offers a personalized residential retreat to match with the user's style.

2.2 Hypothesis

A design model for residential housing that provides changeability and stylistic status can be achieved by using fashion principles to create a new form of architecture.

3.0 Research Documentation

3.1 Background

3.11 In the past- Fashion and Architecture

Cultural, political, religious and environmental conditions are the factors influencing the work of both fashion designers and architects. This can be substantiated through the study of historical buildings and clothing of societies throughout time. In this study, we'll have a better understanding of how people led their lives and made gradual improvements over the past centuries.

The first connection between clothing and shelter occurred way back during the Stone Age when people used animal skins for body cover and animal bone for the structure of shelters. In ancient Greece, columns echoed drapery folds; in cylindrical form, they seemed to be a piece of fabric wrapped over the human body. Both the classical Greek clothing and architectures were conceived in harmony with the proportion of the human figure. A number of contemporary architects, who aspire to create facades with more visual interest, have begun to explore the wrapping and folding technique.

In the middle age, arches played an important role in Gothic churches and buildings. Consequently, the style in fashion and architecture emphasized vertical, pointy, and soaring spaces and structures. Sharply pointed shoes, sleeves, and head decoration directly reflected the Gothic building style. In the eighteenth and nineteenth century, some architects embraced postmodernism's stylized neoclassical elements in revival styles. However, this was replaced by the organic curvilinear shapes with the influences of art nouveau at the turn of twentieth century.

In the twentieth century, having the benefits of newly invented building materials, the lighter materials of steel and glass became the main building construction components. It is worth mentioning that a clean and modern simple design reflected the International Style exemplified by the architecture of architects such as Mies Vander Rohe and Le Corbusier. With the emerging ideals of modernism, both fashion and architecture moved towards more simplicity with ornaments stripped away; the use of simpler forms with more emphasis on

structure prevailed. As a result, function gained a more important design aspect rather than the form in architectural field.

Conversely, the idea of form followed by function has been twisting backward with the adoption of minimalist and deconstructivist styles. Both architecture and fashion industries' designs began exploring new ways to express design during the late twentieth century. With the benefit of high technology, both fields experienced tremendous revolution. New forms and materials were introduced as a result of the new design processes and ideas. Garments became more structural and sophisticated, and more organic and sculptural building forms appeared.

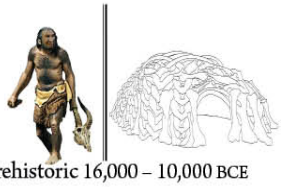
Currently, in the early twenty-first century, architects and fashion designers are paying more attention to green designs. Building design has placed more concern on nature and environmental impact; whereas, fashion design has utilized recycling materials for the garments. Fast growing technology allows both fashion and architecture designers to incorporate high technology into their garment and building designs. These transformable garments and buildings could be *the* new trend for the 21st century.

Figures 1 to 4 are the illustrations of parallel studies in architecture and fashion development and relationships from the past to present.

HISTORY

FASHION ARCHITECTURE

The skin of leopard or lion fastened across the shoulders and at the waist.



Prehistoric 16,000 – 10,000 BCE

Dwelling constructed of dozens of mammoth skulls and bones or wood post framing structure.

Throughout the history of civilization, began with the simple loincloth and straight close fitting wrapped dress to the form of the costumes grew more detailed and more decorative.

Ancient Egypt 3500 - 600 BCE

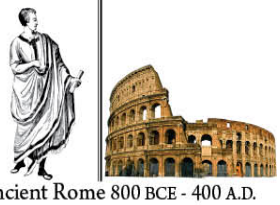
The building materials in ancient Egypt were mud brick and stone, mainly limestone. Their architecture is bases mainly on religious monuments with post and intel structure. The exterior and interior wall, plus columns were covered with carving painted and illustrative frescoes in bright colors.

"Chiton"a single rectangle of fabric and wrapping it around the body, securing it at the shoulders with one or more pins, it was often added belting to create a manipulate fold over the top of the fabric.

Ancient Greek 2900 - 300 BCE

The common materials of Greek architecture were wood, limeston, marble for columns and beams with timber for roof trusses. There were three main architectural orders for temple "Doric", "Ionic", and "Corinthian", from simple shaft rises directly from the stylobate without a base, to Ionic and corinthian have more decorative design.

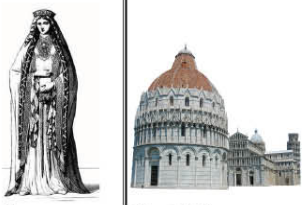
Roman adopted Greek's garments and styled it into greater variety of shapes with emphasis on rounded or elliptical forms. It also rely on the draping of a single piece of fabric and make greater use of cutting and sewing.



Ancient Rome 800 BCE - 400 A.D.

The Romans adopted the architectural style from Greek and created a new style. The invention of concrete allowed the Romans to build arches, vaults and domes. And Marble was the primary building materials.

New costume forms for both men and women to highlight the gender difference in clothing. Men adopted short styles, verse women with long flowing gowns.



Romanesque 300 - 1300

Romanesque adopted in the first Christian churches, followed the ideas of Romans. Stone was a major building material, with massive looking and thick wall and small openings. Interior detailed in decorative round arches with regular symmetrical plan shape.

Figure 1 Parallel Study of fashion and architecture from Prehistoric to Art Romanesque period

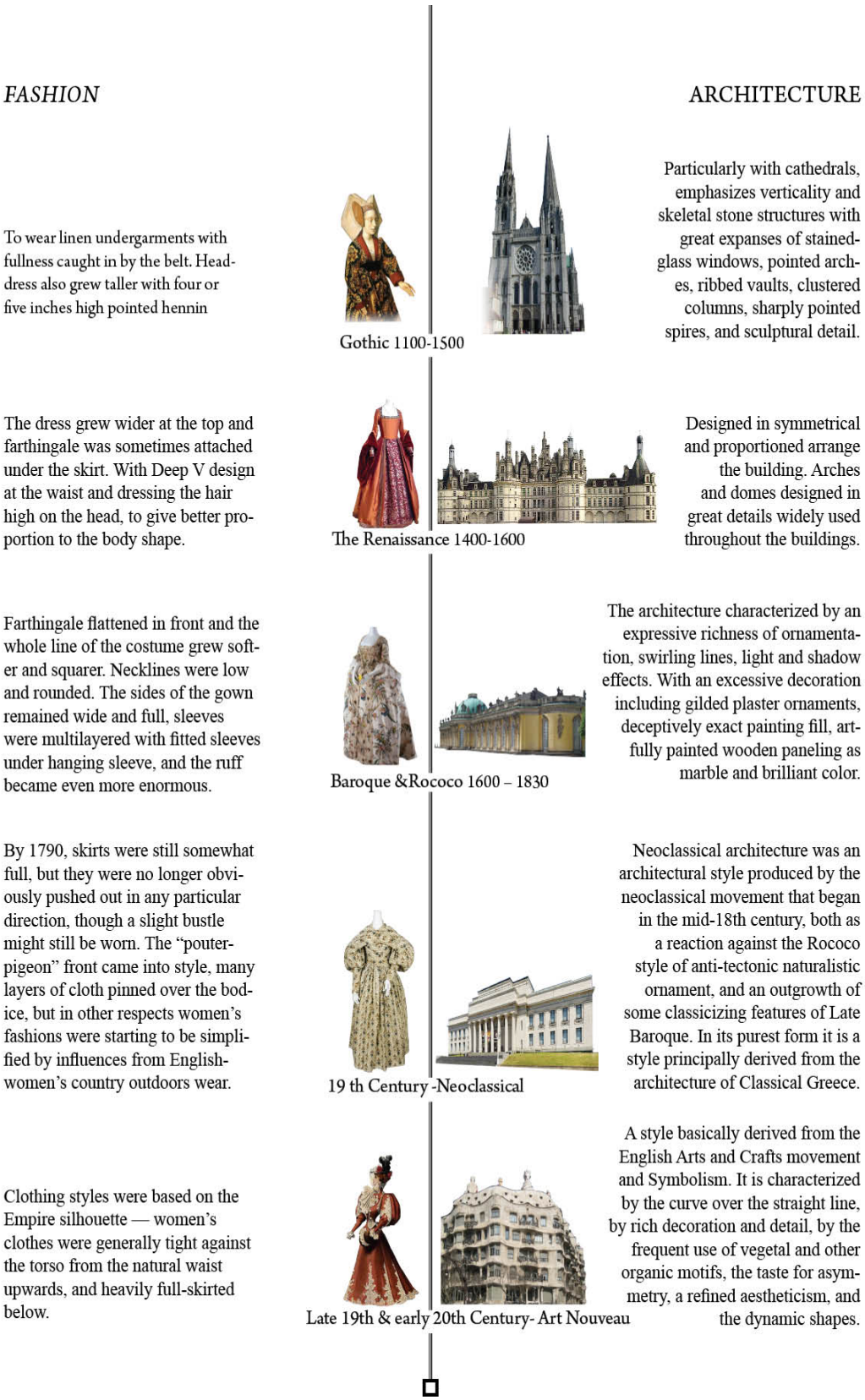


Figure 2 Parallel Study of fashion and architecture from Gothic to Art Nouveau period

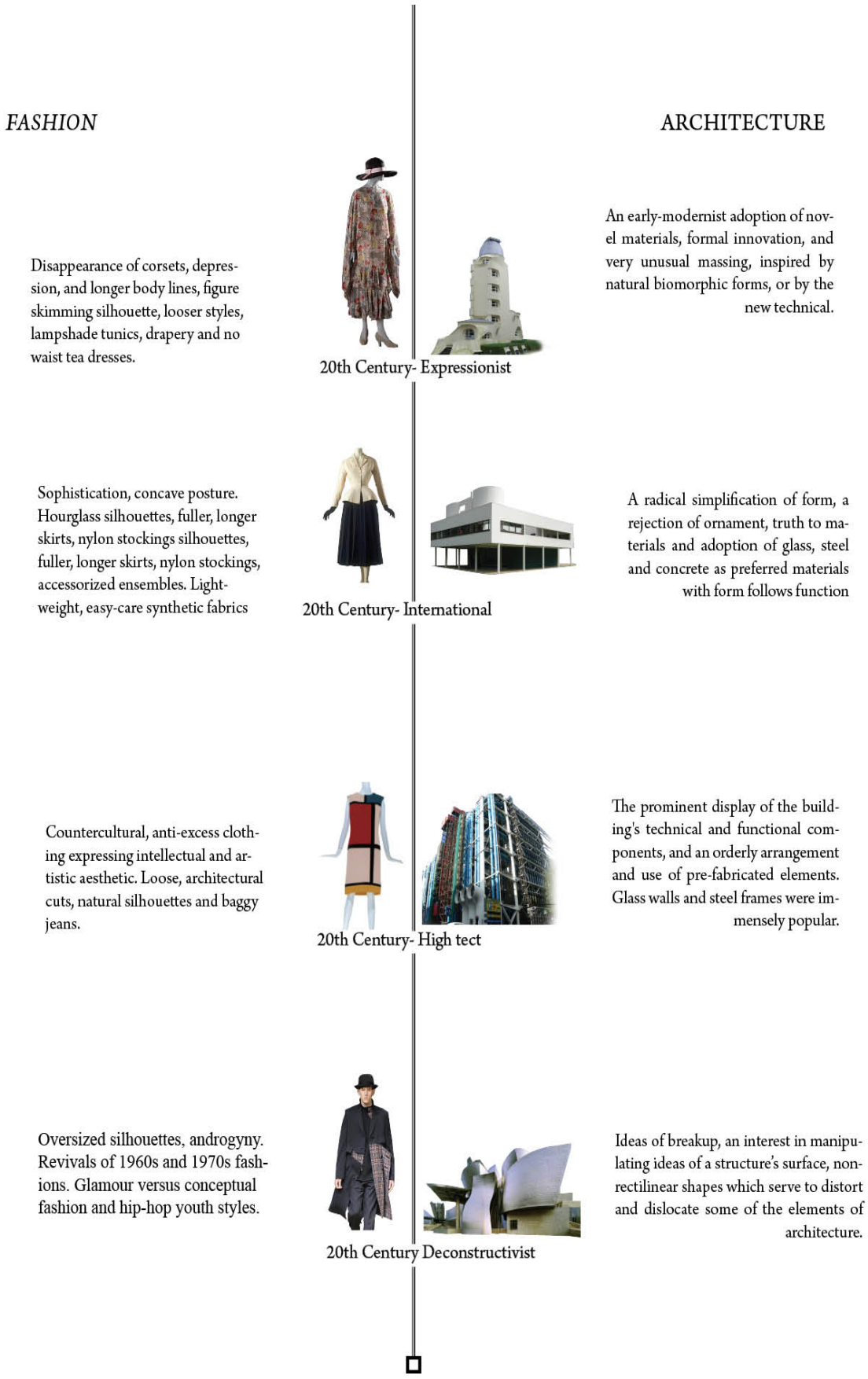


Figure 3 Parallel Study of fashion and architecture on 20th Century

FASHION

Trade recession, grunge and deconstructed styles, ecologically friendly fibers, recycling, anti-fur.

21th Century- Sustainable

ARCHITECTURE

Sustainable architecture seeks to minimize the negative environmental impact of buildings by enhancing efficiency and moderation in the use of materials, energy, and development space.

Body meets dress- dress meets body, organic, bulging form with freeform surface. A New positions so that buttocks, torso and shoulders appeared distended, extended and relocation.

21th Century-Blobitecture

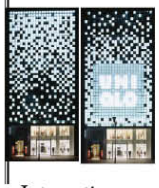
New freedoms of computer modeling, and characterized by a range of stylistic influences from blobby shapes to neo-modern streamlined minimalism and endlessly folding slabs

Eclecticism- automatic transformable garment with the invention of micro-chips, it changes colors, shape and size for different occasions.

21th Century-Transformable

Advance technology to transform the object, reversing one side to the other, or detaching one part to change its outlook. By changing the outlook or the form, the object may become multifunctional use and serve different purposes

High-technology, LED lights and micro-chips interactive with the human movement, temperature, and behavior to provide signal on the garment.



21th Century- Interactive

Interactive architecture is a branch of architecture that specializes on interactivity. Interactivity between the building, people and appliances.

Figure 4 Parallel Study of fashion and architecture on 21st Century

3.1.2 Present- Building needs to be changed

Buildings are usually regarded as more long-lasting and give people the impression of permanence and strength. Once the building is built, it is not easy to modify its appearance, nor to keep up with the current style, and even to alternate its function to meet with the owner's wishes. This perception is partially true, that building is hard to change; but it is changeable and it's actually changing through time. All buildings are changing over time to adapt with changing surroundings and physical deterioration. In "How Building Learn: What Happens after They're Built" by Stewart Brand, he notes that "First we shape our buildings, then they shape us, then we shape them again ad infinitum. Function reforms form, perpetually. Can't fix or remodel an old place in the old way. Techniques and materials keep changing." (Brand pg. 3) He also divided shearing layers of the changes: Site is eternal. Structure is foundation, surviving from 30 to 300 years. Skin is the exterior surface and will change every 20 years to keep up with fashion and technology. Services are the working guts which will wear out every 7-15 years. Interior layout will change from three years for commercial buildings and 30 years for domestic ones. Furniture and belongings will be tweaked daily to monthly. These data indicated different layers will change due to the need of repairing and the material life cycle, the style and the user's preference. Technology and fashion are the main reasons to update building. As the community keeps on changing and growing constantly, the human desire for better living standards is also increased simultaneously. It is normal that new buildings are built following the demolishing of old buildings to keep the city growing. Any building over 100 years will be considered out of fashion. Sometimes, building changes because of its historical value and not because of cost; nowadays, more design efforts are spent on modifying existing buildings than building new ones.

Normally, the speed of changes in commercial buildings is much faster than the other types of buildings. This is the obvious type of building that need to keep in pace with society's trends; otherwise, they will fall behind in business competition. Followed by domestic buildings, they will change according to the user's preference and needs. According to Anne Vernez, "Small lots give greater individual control and greater variety... the

more owners, the more gradual and adaptive the ongoing change" (Brand 75). The rarely changeable type of building is the institutional building, as it is designed to remark the spirit or the glory of the organization concerned. Each type of building has been designed for its own purpose. For those buildings related to business with the purpose of purely making money, they will certainly have a high rate of change.

Real-Estate Influences

Real estate has a great influence on buildings change. As more people flow in, the population turnover in the area becomes higher. The investors and land developers will begin to construct more new buildings. Owing to the limited supply of land in a congested area, they will also consider the alternative of renovating the existing buildings to suit the users. The large amount of investment will revitalize the area and also push up the real estate market. When the community group changes, the building type also follows. When real estate prices are going up, people will buy homes for investment, and modify them to make good money on changing hands. But when the property market slows down, people will live in and make further improvements instead of selling them. This is the way society is recycling itself and the building, similarly, will be reshaped and recycled according to the desire of its owner.

Modifying Old Buildings

Nowadays, people have realized the importance of preserving the historical value of old buildings. "Humans have a taste for things that not only show that they have been through a process of evolution, but which also show they are still a part of one.", said by Brain Eno, the British rock musician. (Brand 11) How can the old building be accommodated and be brought up at the same pace with the society? At present, building code requirements have been implemented for the rehabilitation of historical buildings. To comply with these building code requirements, renovation and restoration works need to be carried out with the aim to preserve these historical buildings which represent our past and culture. Jane Jacobs expressed, "Old ideas can sometimes use new buildings. New ideas must come from old building."(Brand 24) The preservationist, Paul Goldberger, remarked, "A lot of our belief in preservation comes from our fear of what will replace buildings that are not preserved. All too often we fight to save not because what we want to save is so

good, but because we know that what will replace it will be no better" (Brand pg. 93). It is true that working on an existing building is much easier than starting from nothing on an empty site. Since the old building already has its structure, what we need to do is to redesign the façade.

It is not unusual to find that a lot of historical buildings have no longer been used for their original intended purpose; for instance: the old factory mill, the church building, and some government buildings. Many of these historical buildings were ruined and/or were abandoned for some time. Nevertheless, we can also find many of them have been successfully converted into different functions. For example, the old retail store in New York has been converted into high-end residential lofts, the former power station in Madrid has been converted into an art museum, and the market place has been renovated and upgraded into an iconic landmark in Barcelona, while the proposed renovation for the University Tower in Sydney will be covered with an eco-friendly skin as a new façade. All these historical buildings have been abandoned, ruined, forgotten, or detested by the community in the past. Yet, they have become iconic buildings of the areas after the renovation of their appearance by either restoring the existing materials, or adding new material thereon. Now, they all receive the attention of the local people and have even brought in more tourists to the area. Furthermore, the renovation work also brought along other economic effects to the country by creating more jobs, attracting more business and consumers—that have all contributed to a better life for the people. "The Restore New York program is critical to our economic development, smartly leveraging private investment with State dollars so that we provide our neighbors with the resources they need to grow," said Governor David A. Paterson[1]

The Facts

The building is changing although it is not at the pace some may expect. As Stewart Brand said, "Almost no buildings adapt well. They're designed not to adapt; also budgeted and financed not to, constructed not to, administered not to, maintained not to, regulated and taxed not to, even

[1]"Empire State Development." *Empire State Development*. N.p., n.d. Web. 18 Feb 2010. <http://www.empire.state.ny.us/PressCenter/Data/2009/9.03.09_EMPIRE_STATE_DEVELOPMENT_AWARDS_UTICA_RESTORE_NEW_YORK>.

remodeled not to. But all buildings adapt anyway, however poorly, because the usages in and around them are constantly changing." For this reason, the case studies have focused on how the building is adapting and changing along in past centuries. Together with the parallel study in Fashion and Architecture, I found some coherences and interconnections between the two regarding their changeable techniques. These feasible methods for constructing the structure can be easily applied to a building system, according to the user's needs and preference. This research provided me with an insight for designing a dissembling system for the building to be changed in the future.

The most interesting issues for the life of a building actually lie with the human decisions at the time of creation: renovation, demolition or preservation, all of which signify building changes. It is commonly known that fashion is ever-changing and is changeable based on people's whims; in contrast, people's perception for architecture is permanent, the building stands wherever it's built and appears as it did when built. I have adopted the basic characteristic of flexibility in fashion and durability in architecture, and conducted case studies to find out the co-relationship between these two elements and the way to combine them together in my architecture project. To start with, I performed case studies and research on the history and renovation of old buildings. As a matter of fact, buildings will not be permanent without being properly maintained throughout time. Particularly, the function of the building might change more frequently to cope with the needs of society and market demand. Different functions might need different configurations and designs to accommodate with special needs. For maintenance, it might not be possible to use the same material to restore the original façade. Due to these reasons, modification of building is essential throughout time, which also indicates that buildings do in fact change. Through the case study, it is concluded that it is possible for buildings to change their look, just as humans change their clothes. Of course, building changes will take time and effort by the architect(s) and builders as well as the financial support of the investor. In these case studies, I found how the historical buildings changed their functions to meet with society's needs, and what design approaches were adopted by the architects to renovate existing buildings. Taking the role of an appraiser with the view point of fashion

design, I also offer my personal view on these building modifications to expose the link and connection between architectural and fashion aspects.

Case Study Analysis

The first case study of Santa Caterina Market in Barcelona was the most creative and straight forward design to renovate an existing building in order to match with its urban context. The architects placed a waving shape roof to cover the top of the existing market to produce an elegant look. This design approach is to add an extra element to decorate the existing building to give it an energetic feeling and create an iconic landmark for the place. From the point of view of fashion, the existing historical building is in plain and simple clothes, but with an accessory added, it can have a contrasting effect producing a totally different look. The focal point is to reform the additional element while the original elements remain to act as the supportive part. Both elements are essential and can be applied in the appropriate portion without stressing its balance.

With a similar design approach, Caixa Forum in Madrid was renovated by adding an extra element to make the existing building pop out. In this case study, my focus is placed on the materials used and the way that it is incorporated into the existing building to dress it up in diverse ways. In fashion design, there are tons of fabrics that the designer can choose by mixing and matching them together to find the perfect harmony. However, not many building materials can be used in architecture that is durable enough to form the building envelope. The obvious point in this renovation is that the architects converted an unpleasant material—copper—into an intriguing element and presented it as an additional extension of the building. In addition, the architects also dressed up the large plain blank wall with thousand of real plants to form a vertical garden. In this sense, the wall becomes a large living colorful picture with different species of plants. This not only created an interesting visual effect for the visitors, but the plants also produce a fresh air environment for the neighborhood. The materials used are perfectly matched with the function of the building and absolutely go well together with those existing materials. The different elements are balanced perfectly together, unlike the design in Santa Caterina Market in which one element stands out from the others.

Turning to the case of 15 Union Square West, it is one of the typical examples to demonstrate how a building adapts through time, by having changes in its function and appearance several times since it was built. The building transformation is strong evidence to support the fact that building is actually changing through time to cope with the needs of the society. The transformation of the building appearance was started from a classical detail cast-iron façade in the early century to a simple sheetrock façade of "Less is more" style in the 50s. At present, the building has again transformed into a modern glass façade which has incorporated modern design methods to catch up with on-going society. Regarding the function of the building, it was originally designed as a high-end jewelry store but due to a security problem, it changed to a factory mill, and in the 50s it was again taken up by a bank. The change of function went along with society's needs. Now, it has become a high-end residential condominium. In this case study, we noted that even though the function and façade kept changing, together with the change in the interior layout and design, the structural element of the building has never been changed. With the several modifications in the past decades, the building is still keeping its own unique elements but the add-on value has made it more valuable in society than before.

The last case study is UTS Tower building, which is a proposed project. However, this will be the future trend in transforming the existing building's appearance. This concept approaches the idea of dressing the building with clothes. This case study will bring us to an upper level to ask what will happen to the building in the future. After all, this will be the most appropriate example of what I am trying to achieve in my doctorate thesis. The challenge in this renovation is to create a structure system to attach to the existing building by simply using the fabric to wrap around the building. It is the eco-friendliest, the easiest, and the cheapest method to do the renovation with.

Conclusion

How buildings change will all depend on how the building needs to be adapted in society. The building change involves either the change in building type or the change in its outlook. The elements which will be kept or demolished all depend on their importance. Moreover, it is hard to transform an existing building to match with modern design than to design a brand new one, as more research work needs to

be done and careful consideration needs to be made on the existing structural elements. I agree with the view that a building can become interesting in its own way. It will always involve enormous work and is unnecessary to customize the building to meet with new technology. With the advancement in technology, the building material becomes relatively lightweight and flexible over decades. "Let the technology adapt to the building rather than vice versa, and then you're not pushed around when the next technology comes along. Spend more on basic structure, less on finishing, and more on perpetual adjustment and maintenance" (Brand 190). Regarding the building shape, it is easier to build in a square which is the most efficient and produces the best configuration of space for the occupants. "If you start boxy and simple, outside and in, then you can let complications develop with time, responsive to use. Prematurely convoluted surfaces are expensive to build, a nuisance to maintain, and hard to change" (Brand 192).

In these case studies and research, I have found different methods for renovating an existing building, from simply one by adding additional element thereto, to the more complicated one of replacing the entire façade. Moreover, it is also true that building can and will change eventually through time either with its building element or its function. Besides, the building changes are all proved to be successful in upholding their value, and to bring along more economic value to the area as a whole. Finally, it is more important to provide people with a new perspective that buildings can be changed to retain their attractiveness.

"A building is not something you finish. A building is something you start." (Brand pg. 188)

3.2 Case Studies

3.2.1 Case Study 1-

Santa Caterina Market

3.2.2 Case Study 2-

Caixa Forum Madrid

3.2.3 Case Study 3-

15 Union Square West

3.2.4 Case Study 4-

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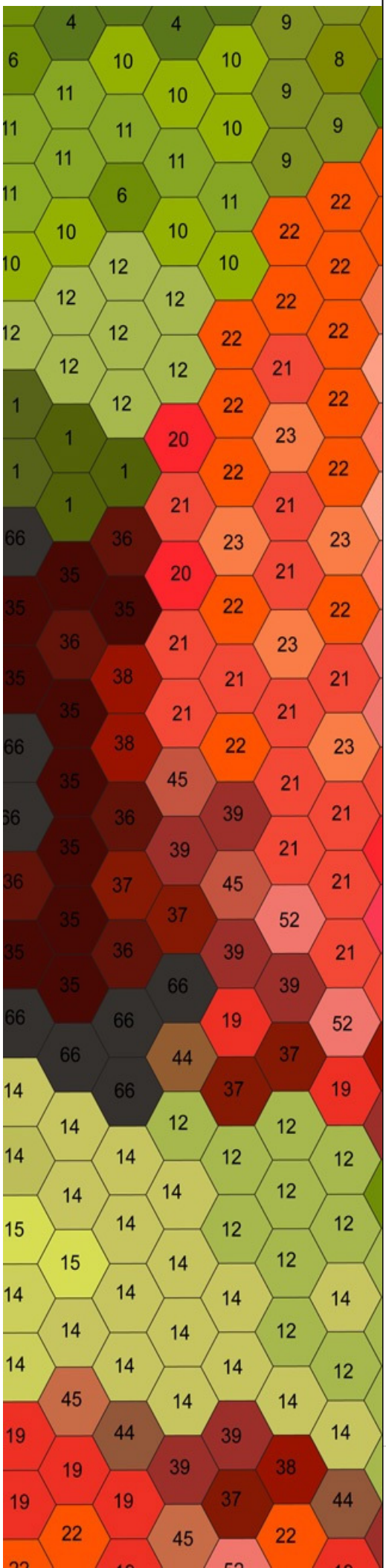
3.2.5 Case Study 5-

University of Technology Sydney



3.2.1 Case Study 1- Santa Caterina Market

Location:	Barcelona, Spain
Completion:	April 1997 – May 2005
Architect:	Miralles/Tagliabue- EMBT
Owner:	Foment de Ciutat Vella S.A
Original Building:	1848 Santa Caterina Market
New building:	Three-level structure Market
Reason:	Area revitalization

History of the building and the reason for the renovation

Santa Caterina Market is situated in the centre of Ciutat Vella, in Ribera Quarter. The building was constructed on the former site of the Convent of Santa Caterina of which the name was derived from. This building witnessed Barcelona history in the post-Civil War period. There were a lot of buildings being burnt down by anti-clerical Catalan revolutionaries in 1835. Santa Caterina Convent was also knocked down and the site became the market place for the main food suppliers serving the population in Barcelona and in nearby towns. According to the information contained in Santa Caterina Market's official website, people came from Sant Adrià, Santa Coloma and Mataró by tram to buy food in this market at the time of a supply shortage.[2] Later on, the site was handed to Barcelona Town Hall for constructing a real market place. The construction work was begun in 1844 and the market was opened in 1848. Santa Caterina Market was the first market with covering in Barcelona, in which the wholesale and retail merchants were allowed to conduct business. Therefore, this market has become the great impulse of Barcelona traditional trade.

Since the 19th century, the city began to refurbish its urban plans. The city government intended to improve the environment of the inner city of Barcelona in respect to its congestion, poverty, crime, and lack of open space and services problems. With the historic center interventions in recent years and the financial backing from European Union economic development grants, there were massive clearances of slums, and a large-scale demolition took place.[3] Ciutat Vella was one of the targeted places in the city's revitalization efforts. The market was built in mid-18th century and had not been preserved well (it'd begun to crack). A design commission, composed of Enric Miralles and Benedetta Tagliabue (EMBT), in 1997 restored the market building.

The new design has transformed the 159 year old market building into a modern structure of the 21st century. The design and planning are perfectly suited to the

[2] "Mercat de Santa Caterina." *Mercat de Santa Caterina*. N.p., n.d. Web. 18 Feb. 2010. <http://www.mercatsantacaterina.net/>

[3] Cohn, David. "Architectural Record | Project Portfolio | Rehabilitation of Santa Caterina Market." *Architecture Design for Architects | Architectural Record*. N.p., n.d. Web 8 March 2010. <http://archrecord.construction.com/projects/portfolio/archives/0602santaCatarina.asp>

urban area. The look of the newly restored market is absolutely wonderful with its apartments' windows and balconies. The restoration work was to cover the whole market with an eye-catching colorful roof giving a splendid look to the area; yet, without interrupting the design of the neighborhood. It has given a fresh outlook to the area, even though it seems to have packed everything together.

The construction work of the design took seven years to complete. It was not because of a political or financial problem, but due to the combination of the complex development with the compressing revitalized market. The plan had been constantly changed regarding its functions with the ideas of building a museum, two blocks of 59 low-rent social housing for senior citizens, an underground car park for articulated Lorries serving the market and 250 cars, and an "organic waste depository" for the Santa Caterina and La Ribera districts of the city centre.

Design Intent

Rehabilitation of Santa Caterina Market

Transform an unfriendly non-classical food market into an agitated colorful structure. This was not just a project to design a market place but to convert the area into a pleasant public space. This is the city which is full of Gaudi's work which has been highly admired by the people and has already formed part of the local culture. This is one of the reasons why the new roof structure was designed with the colorful mosaic pattern. The architects, EMBT, explained in their brief, "The first mistake is to talk about old and new. Whatever has managed to survive into the present is current, useful, and contemporary. And it permits us to move back in time in order to continue forward."

Figure 6 First design proposal of the market renovation

Figure 5 Main entrance to the market from the pedestrian side

Figure 7 Market main entrance

Project

The inner part of Santa Caterina Market has been renovated almost completely under the project. The architects preserved the white-painted masonry walls on three sides of the rectangular façade of the 1845 original market structure. They used the same granite pavers on neighborhood city streets for decorating the market interior, to give a sense of the market as part of the public space. Since the market did not need to be so large, the architects demolished the rear wall to make room for an intimate plaza. The project also included the design of housing for elderly residents and extension of the existing narrow streets. "The new market building, an essential part of the Porta Cambo opening global plan, is structured on six actions: Apart from Santa Caterina itself and the car park, the following steps are planned to preserve the existing archaeological remains and to build houses for old people, as well as for the residues pneumatic central collection, the underground park place to facilitate goods loading and unloading and finally the urbanization of the surroundings." [4] Santa Caterina Market has totally reformed the surrounding public space. It is also the first reform made after that of the thirties, when the top covering was renewed. The total project cost amounted to US$25 million in respect to the neighborhood revitalization.

[4] "Mercat de Santa Caterina." *Mercat de Santa Caterina*. N.p., n.d. Web. 18 Feb. 2010. <http://www.mercatsantacaterina.net/>

There are 325,000 ceramic tiles from Seville hanging on the roof with the steel arches supported by a steel and timber frame. The form and structure of the complex roof design needed to be generated by computer calculation. However, all individual laminated roof panels were cut by hand. Therefore, the construction processes involved both modern technologies and traditional hand-made techniques.

Figure 9

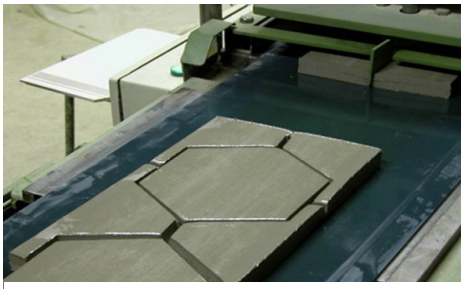


Figure 8

Figure 11

Figure 10

First left - Color samples

Second left – Each color has specific number to match with the finishes tile

Third left – Tile manufacture process

Right hand side – The tiles are manually laying on top the roof individually by colors

Three tense arcs and 6 V shape girders are hanging on the central part of the building and the whole metallic structure weighed 604 tons.[5] Apart from these arcs, the top covering is supported by two main concrete girders situated all along the central aisle. The total surface of 4200 square meters are formed with 109 wooden arcs, geometrically varied, as well as the finished top covering contained wooden purling and joints with a final effect in colored ceramic. Toni Comella is the artist who created the mosaic with vivid color to represent vegetables and fruit. He used 200,000 ceramic hexagons of 15 cm each to form the design which consisted of 67 colors to cover the entire mosaic roof.

Figure 13

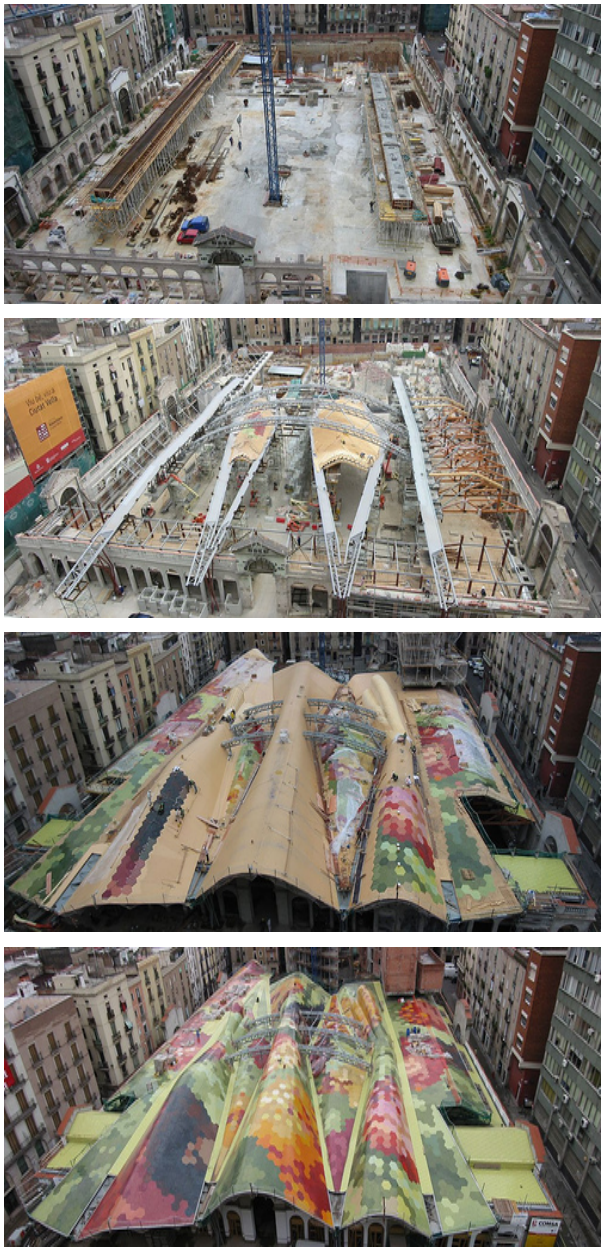


Figure 12

Construction progress from the beginning of the blank site to completion.

1. The site and neighborhood environment with existing façade. Demonstrates the interior has been completely made over.
2. Roof structure framing to support further construction. The bracing system of framing.
3. Cladding process on the roof.
4. Final completion work of the roof construction

[5]"Mercat de Santa Caterina." *Mercat de Santa Caterina*. N.p., n.d. Web. 18 Feb. 2010. <http://www.mercatsantacaterina.net/>

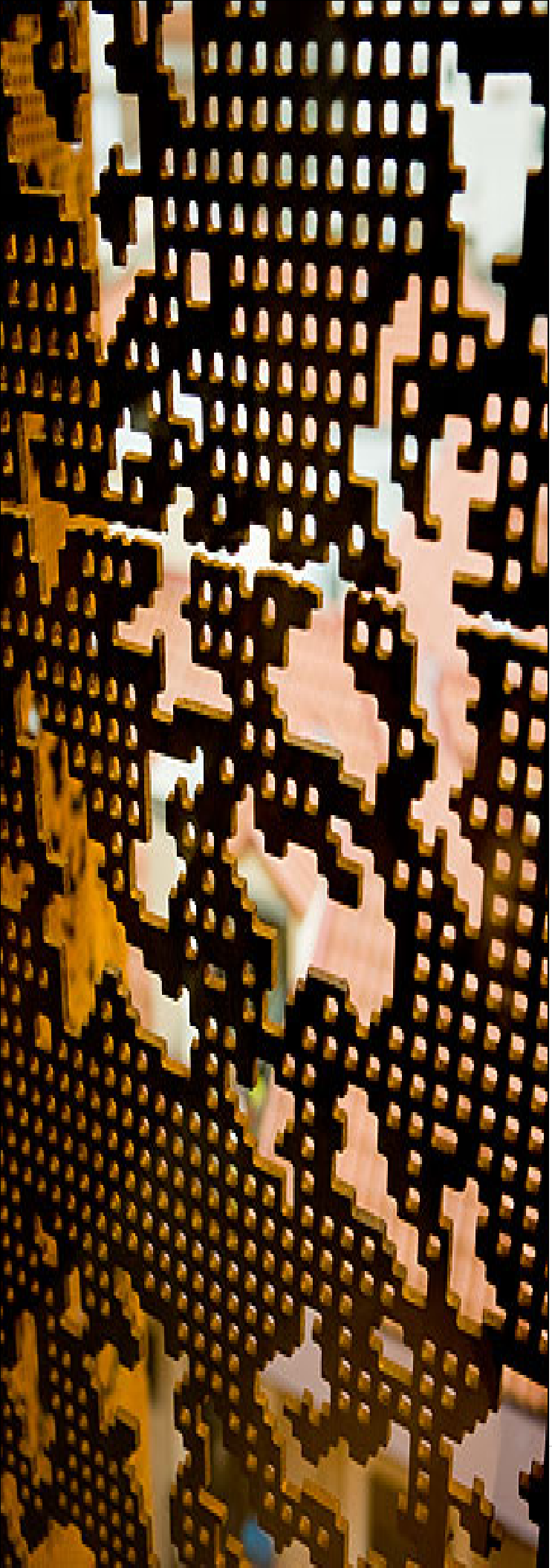
Conclusion

Santa Caterina Market is an interesting architectural project not only because of its shape, but also its function as a market place. I never thought that the public sector would invest such a huge amount of money for renovating a market place. In fact, this is not just an architectural design but also urban planning for the renewal of the surrounding area. Ever since, it has become one of the center hubs and an icon of the area. The renovation for revitalizing the area has created jobs and attracted more business and visitors. It also brought up the real estate market. From the point of view of architecture, it has successfully preserved the original building by adding directly an additional roof on top. In addition, the design has integrated innovative material with modern technology.

From an elevated view, the roof looks simple with only a couple of curves. However, looking from the aerial view, the structure looks completely different. The way the roof was designed looks like soft huge fabric is lying on top of the building covering the entire area. The curves and dips seem randomly laid out. I like the suddenness of changes followed by the structure's needs. The architect took advantage of the flexibility of fashion design technique and incorporated this brilliantly into an architectural form. Plus the vibrant use of color is rarely seen in architecture. The result comes out fresh and smooth, almost like it is a natural painting for the nearby residents to enjoy. The design approach is much better than the traditional flat or pitched roof.

In this case study, it's clearly illustrated that the community wanted to improve the city environment and also to preserve some of their original culture at the same time. In this regard, the architects, therefore, came up with this iconic structure that is creatively designed to support the curving roof. From this point, we can see the architects have paid a lot of attention to the detailing. I also appreciate the design idea of applying the local culture into the architecture by creating a colorful motif roof. It seems as if the original building wears a colorful hat. This design has also created a fresh and vital element to the neighborhood. Although the design appears to be taking an easy approach by putting extra material on top, the construction processes are in fact far more complicated. Nevertheless, the renovation result turned out to be marvelous and has received great appreciation from people. This design project also demonstrated that

people love changes and improvement that can bring them a better living environment. Similarly for fashion design, people welcome different fashions at each season. Of course, the change in buildings may take a much long period than that of fashion.



3.2.2 Case Study 2 – Caixa Forum Madrid

Building Site:	1,934 square meters
Building height:	Seven story building
Location:	Madrid, Spain
Function:	Cultural Centre
Completion:	2008
Architect:	Herzog & de Meuron
Client:	Obra Social Fundacion "Le Caixa"
Original building:	Power Station
New building:	Cultural Centre

Historic Context in Spain

The tourist industry in Spain is strong and has become one of the main financial resources in the country. The number of tourists grew rapidly during early 60s' to 70s'. In 1986, Spain joined the European Union (EU) and was eligible to obtain EU funding that would amount to $110 billion over the next 20 years for application in the construction of new highways, bridges, railroads, train stations, and other civil infrastructure projects.[6] In this regard, it enables the country to improve its urban planning and cultural infrastructure so as to bring in more tourists that can directly contribute to the economic growth of the country. Guggenheim Museum Bilbao has been one of the most successful cases in modern and contemporary art that attracts tourists. Therefore, the Spanish Government and the public sectors were supportive on the cultural infrastructure for building museums, auditoriums, stadiums, and congress centers, etc. The following case study is another typical example for converting a historic building into an innovative contemporary museum.

History of the building

The old Central Eléctrica del Mediodía was designed and built in 1899 by architect, Jesús Carrasco-Muñoz Encina, and engineer, José María Hernández, at the site of the old La Estrella candle factory at the request of José Batlle. The block of buildings covered 1,934 square meters with the boundaries beginning at Calle Gobernador in the north and ending at Calle Almadén (formerly Travesía de Fúcar) in the south, starting from the east at Calle Cenicero to the west at Calle Alameda. After an eventful administration procedure, the power plant was finally inaugurated in March 1901 and soon became one of the key plants in Madrid.[7]

Originally, the Central Eléctrica del Mediodía, was erected as a large coal-fired power plant to supply electricity to the whole southern sector of Madrid's old town. This power plant building was abandoned following the erection of another new power station and gas station

6 "ON-SITE: NEW ARCHITECTURE IN SPAIN HIGHLIGHTS SPAIN'S RECENT." Museum of Modern Art 30 Jan 2006: n. pag. Web. 9 Mar 2010. <http://press.moma.org/images/press/PRESS_RELEASE_ARCHIVE/OnSight.pdf>

7 ""la Caixa" Social and Cultural Outreach Projects inaugurates the CaixaForum Madrid, a new concept in social and cultural centres ." "la Caixa" Press Room. N.p., n.d. Web. 8 Mar 2010. <http://press.lacaixa.es/socialprojects/view_object.html?obj=816,c,3730>.

at the same location. The building was left unattended by people and the brick wall was losing its brickworks as time passed; and it was finally razed in 2001. The property was then bought by La Caixa in the same year. According to the survey, it reported, "There is a general state of neglect and ruin that is gradually and inexorably affecting both the exterior appearance as well as the stability". As the four facades of the building were listed "grade 3", it means they had to remain in the location, by Madrid's urban development plan, the appearance of this power plant building should be reinstated as it was originally conceived, albeit with some modifications to hold the CaixaForum Madrid.[8] Therefore, the project restoration was taken up by a Swiss architect, Herzog & de Meuron. In view of the existing difficulties that the building was situated in the middle of narrow streets and had been cut off by the gas station from the nearby avenue of Paseo del Prado, the architect had convinced the client to buy and demolish the gas station to enlarge the entry plaza and establish a connection to the Paseo, Madrid's Museum Mile. Furthermore, the location of the power station had some limited protection for its role in the early establishment of electricity in Madrid, but the local Heritage Commission approved its partial demolition based on the project's merits and public benefits.[9]

Figure 14 Original Building and Site

8 ""la Caixa" Social and Cultural Outreach Projects inaugurates the CaixaForum Madrid, a new concept in social and cultural centres ." "la Caixa" Press Room. N.p., n.d. Web. 8 Mar 2010. <http://press.lacaixa.es/socialprojects/view_object.html?obj=816,c,3730>.

9 Cohn, David . "CaixaForum | Project Portfolio | Architectural Record." Architecture Design for Architects | Architectural Record. N.p., n.d. Web. 8 March 2010. <http://archrecord.construction.com/projects/portfolio/archives/0806caixaforum-1.asp>.

The renovation of the building represents a new concept in the erection of a social and cultural center that can best fit in the 21st century for promoting the value of culture and social integration. Indeed, this is one of the few successful cases in which industrial architecture was rehabilitated in Madrid. Caixal Forum Madrid is owned and operated by the Social Works Foundation of La Caixa, the Spain's largest savings bank.[10] In Spanish law, modern Spanish savings banks are nonprofit institutions with no shareholders and no expectation or requirement to distribute dividends. The profits made by the savings banks are devoted to the public good. In the old days, the function of the savings banks was typically to help farmers out through lean times and troubled harvests. Today, their functions have become various, covering a vast array of public work foundations, supporting medical research, reforestation, granting scholarships, financing historical preservation, sponsoring art exhibitions and even establishing their own cultural centers.[11]

Design Intent

"Not being able to start from scratch and having to respect the outer layer of brick, protected as Madrid's heritage and indicative of its early industrial era, has not been a handicap but has forced us to look for particular solutions in designing a unique and remarkable building" said, Herzog & de Meuron. [12] According to the architects, there were four basic approaches for the restoration of the building, i.e. to restore the exterior facade brick using traditional techniques, to get rid of the stone base around the power station, to open a new public square with an entrance on Paseo del Prado and to add volume.

10 Cohn, David . "CaixaForum | Project Portfolio | Architectural Record." Architecture Design for Architects | Architectural Record. N.p., n.d. Web. 8 March 2010. <http://archrecord.construction.com/projects/portfolio/archives/0806caixaforum-1.asp>.

11 Ferren, Andrew. "In Madrid, banking on the art scene." The New York Times. N.p., 21 Dec. 2008. Web. 18 Feb. 2010. < http://www.nytimes.com/2008/12/21/travel/21iht-21culture.18845469.html?_r=2>.

12 ""la Caixa" Social and Cultural Outreach Projects inaugurates the CaixaForum Madrid, a new concept in social and cultural centres ." "la Caixa" Press Room. N.p., 13 Feb. 2008. Web. 18 Feb. 2010. <http://press.lacaixa.es/socialprojects/view_object.html?obj=816,c,3730>.

Project

The project cost over $96 million and had 40,000 out of total 115,000 bricks of the building replaced; in addition, all 4 facades had to be stapled and reinforced in order to transform the property into the Caixa Forum Madrid.[13] The facades were traditionally crafted with bricks which had to be reinstated one by one using limestone mortar. The total area of the new Caixa Forum has been expanded to 10,000 square meters from the original size of about 2,000 square meters, representing five times the original one. The platform that originally supported the power station has been removed and is replaced by three points of support. The area underneath the public square has been excavated to provide more space for the lower layers. The upper layers of the building appear to be a floating cube on the site that attracts visitors to go inside. The sheltered space underneath the Caixa Forum offer visitors shade from the sun, a gathering place for the public and also an intriguing entrance to the Forum. The separation of the structure at the ground level splits the functions for the levels below and above and gives people different feelings of each place.

Program

The new Social and Cultural Centre has a total of seven levels including two basement floors and a ground floor that connects with the public space and four upper floors. The program for Caixa Forum provides over 2,000 square meters for exhibition area, 322 seats in the auditorium, a media library, multipurpose rooms, and workshops.

- Level -2 - parking, access to works of art, and auditorium foyer
- Level -1- halls, conservation workshop, warehouse,
- Plaza Level 0 - public access to the center
- Level 1 - lobby, cafeteria, shop-bookstore
- Level +2 - showroom
- Level +3 - exhibitions and media
- Level +4 - restaurant and offices

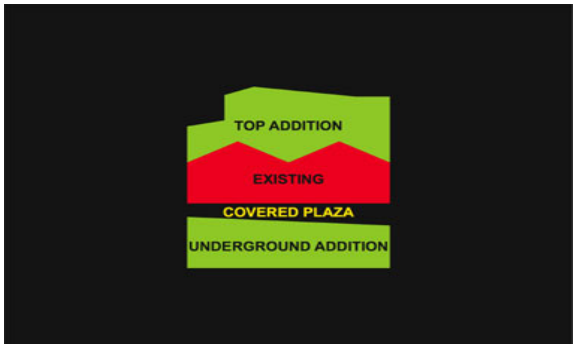


Figure 15 Building Diagram

13 ""la Caixa" Social and Cultural Outreach Projects inaugurates the CaixaForum Madrid, a new concept in social and cultural centres ." "la Caixa" Press Room. N.p., 13 Feb. 2008. Web. 18 Feb. 2010. <http://press.lacaixa.es/socialprojects/view_object.html?obj=816,c,3730>.

Structure

The renovation work completely got rid of the interior and emptied out the whole platform, leaving just four brick facades. The main support for the floating cube above the ground are the sculptural stairs which ascend from the plaza into the lobby area; while the underground level can only be reached from this staircase. The stairwell is a tapered vertical shaft which is important for structural reasons because it is the largest of the three vertical supports that elevate the building above the plaza. The shear- and torsion-resistant structural core of the building, it functions like the vertical core of any high-rise building, except that it's roomy and admits daylight from above. But the stairwell has no 'museum atrium' and it is completely out of view with respect to the rest of the building, precisely because of the load-bearing and fire-resistant role of its heavy white concrete walls. [14]

- **(Figure 16)** – Physical section model and section drawing clearly shows the main support of the building

(Figure 17) – Construction of the addition floors and decorative panels on the façade

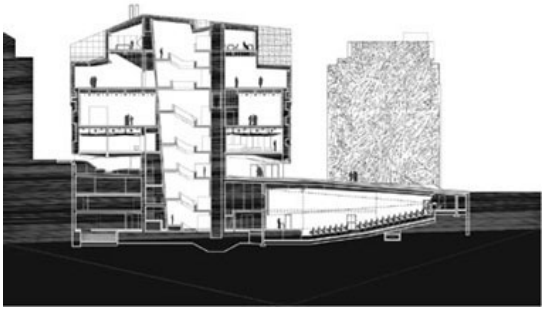


Figure 16 Section

Figure 17 Construction

14 Moriana, Rafael . "Exquisite Corpse: CaixaForum Madrid by Herzog + de Meuron." Criticalismo. N.p., 1 June 2008. Web. 18 Feb. 2010. <criticalismo.blogspot.com/2008/06/exquisite-corpse-caixaforum-madrid-by.html >.

Materials

The architect manipulated the form and material used. The basement of the foyer and auditorium is covered by the expanded sheet metal mesh to create an undulating surface contradicting the oak wood surface on the floor. (Figure 19)

At the lobby level, the staircase and wall are covered with triangular shape of stainless steel to produce a futuristic sensation. (Figure 18)

The restaurant and administrative offices are on the top floor, which is covered with galvanized iron panels containing irregular holes to allow natural light to come in. (Figure 20)

This new innovative material produces a contrary effect to the traditional brick wall on the lower levels.

Figure 18 Lobby

Figure 19 Auditorium

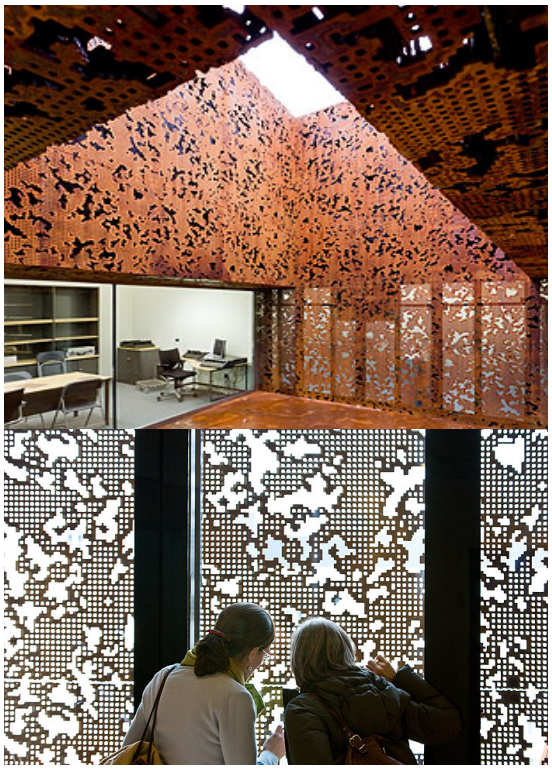


Figure 20 Restaurant and administrative office

The Vertical Garden

After removing the gas station which was seated between the building and the wide Paseo del Prado, the building was left with a solid brick wall at the side of the Caixa Forum. To deal with this blank wall, the architect worked with the botanist, Patrick Blanc, to design a 75-feet high vertical garden to cover the wall. The 5,000 square-feet wall is covered with 15,000 plants of different species to create varying shades of green and patterns. "Plants don't need earth but only water, minerals, light and carbon dioxide" as proposed by Patrick Blanc. This vertical garden façade design is a completely innovative design on one hand and also creates a visual effect when seen from a distance.

Figure 21 Green Wall

- **Figure 21 –** Shows the human scale and the vertical garden proportion
- **Figure 22 –** Perfect color and material combination

Figure 22 Night View

Conclusion

Caixa Forum Madrid is a typical case to show how a historic building can be preserved and transformed into a modern and chic cultural center. It is also similar to the Santa Caterina Market project in that both projects have the same idea of adding additional elements to enhance their original historical structures. The major difference between the two is the complete change in the function of Caixa Forum from a power station to a cultural center that required a lot of thoughtful consideration. The most precious thing in the restoration of this historical building is to reinstate it from the ruin; yet, nobody would have

noticed or cared about this old abandoned building until it came to vitalization. In the conversion of this building, the main challenges are to keep the original façades and by using unique modern materials merged with traditional materials to make the otherwise invisible building stand out from the crowd.

The shape of an additional part looks like a crown on top of the historical building. Caixa Forum does not have vibrant color like Santa Caterina Market does. However, the materials used were both astounding and intriguing. There is a big contrast of the material texture, from hard vs. soft (Brick wall and Green wall), solid vs. void (Brick and metal panel), and also the color contrast is outstanding on the whole. This building has been weighted heavily on its innovative materials used to redress the original structure, not only the exterior but also the interior. The challenge in the restoration process is to apply the modern material to match with the existing building. Architects need to possess a lot of thoughtful ideas on the design and need to conduct a lot of research and experiments to select the unique materials with durability for the re-erection of the building.

In this design solution, the architect solves the problem by using similar color tone on material to match with the existing brick color, even though the material itself has different texture and surface, the two elements can still match perfectly. Moreover, the architect used different approaches and reversed color tone for the interior to create a futuristic and modern look for the complex which breaks away from the historical style from the façade. People had different perspectives when they went into the building. All of these approaches are fundamental design techniques. However, these varieties of big contrast of material and color use are usually seen in fashion instead of architecture. And this is the reason I choose this renovation project as one of the case studies to show how architects might apply different materials to buildings in a nice and workable way for architecture.

Finally, the architects have successfully completed the mission with their thoughtful design and innovative materials which have created a whole spatial experience for the visitors. In addition, the bright idea of a vertical green garden transformed from a blank white wall has produced a special distant visual effect for people visiting the site. In addition, from this case study, I appreciated the ingenuity of the architects

to persuade the client to make the wise choice to purchase the extra plot of land with the gas station blocking the old power station to create additional public space for the visitors, and also in the architects' making good use of the underground space. It is also true that the transformation of a historical building in function and outlook can definitely bring back public attention and the re-vitalization of the area with the enhanced art and culture elements.

3.2.3 Case Study 3- 15 Union Square West

Location:	southwest corner of 15 street and Union Square West
Completion:	2008
Architect:	Perkins Eastman
Client:	Brack Capital Real Estate
Building Sq/ft:	81,000 sq/ft
Building height:	Seven story building
Original building:	1870 Tiffany and Co.
New building:	Shops & condominium
Reason:	Higher real estate value

Union Square

Union Square is located in the heart of New York's Downtown, with a pleasurable park as a hub area to bring people together for different community events and functions. The area contains a perfect combination of history and arts. Among the neighborhood there are greenmarkets, theaters, retailers, small businesses, universities, and hospitals, all of which are within walking distance of the park. In order to improve the streetscape and enhance the neighborhood's quality of life, the community offered property owners and retail tenants financial incentives to undertake improvement work for their property or storefront.

History of the building

In 1869, it was observed of Union Square by the New York Times that "the great business firms of downtown are encroaching on the once aristocratic thorough fares of the upper portion of the Metropolis." Tiffany & Co. opened its store in this area in the same year and its building became one of the most complex cast-iron structures in New York City. The company building was originally commissioned in 1870's by Charles Lewis Tiffany who had opened stationery and fancy-goods shops since 1837; it had turned into one of the leading jewelry stores in the country by the 1850's. The Tiffany building was built at 15 Union Square West and John Kellum was the architect, known for creating ornate facades in cast iron style. The building cost $500,000 at that time and was supposed to be fire resistant as compared to other typical loft buildings. The building was described by the New York Times as "the palace of jewels" with black-walnut counters and ebony cases holding watches, fans, opera glasses, wood, leather, silver, cloisonné, enamel, bronze and rosewood. (15)

Figure 23 Tiffany & Co. Building

(15)GRAY, CHRISTOPHER. "Before Tiffany & Co. Moved Uptown - New York Times." The New York Times - Breaking News, World News & Multimedia. N.p., n.d. Web. 3 May 2010. <http://www.nytimes.com/2006/07/02/realestate/02scap.html>.

The New York Times also described the building as “a 50-cent pin can’t enter or leave the establishment without its history being fully known and recorded” for its high security. Conversely, as years went by shoplifting occurred one by one and this had alerted the company of the security problem. Previously, Union Square was a luxury commercial area but the city had gradually shifted the prosperity Uptown following the relocation of the retails. In this circumstance, Tiffany also decided to leave Union Square in 1905 because of the security issue and the new allocated site bought at 37th and Fifth Avenue. The building was then rented out to an underwear importer, shirtwaist makers and other garment companies. Until the end of 1925, Amalgamated Bank had taken over the building. (Figure 24)

Amalgamated Bank did not make any changes on the original façade since its takeover. It was not until an accident happened in July 15, 1952 in which a piece of cast iron came loose from the building’s façade and hit Moses Weickselbaum, a salesman who lived in Brooklyn; he died the next year of his injuries. After that, Amalgamated bank hired an architect, Eugene Schoen, to secure the façade. The architect stripped off all the cast iron on the façade and covered the building structure with sheetrock (Figure 25). The building had lost its uniqueness, becoming a white simple building which formed part of the polyglot assortment of Union Square’s architecture, that has mixed with Romanesque, Queen Anne, Federal, postmodern and other styles.[16]

Figure 24 Cast Iron Façade

(16)GRAY, CHRISTOPHER. "Before Tiffany & Co. Moved Uptown - New York Times." The New York Times - Breaking News, World News & Multimedia. N.p., n.d. Web. 3 May 2010. < http://www.nytimes.com/2006/07/02/realestate/02scap.html>

15 Union Square West, 1837

In 2006, Brack Capital Real Estate bought the building from Amalgamated bank for $80 million. The investor intended to convert the building to a luxury residential condominium with high end retail shops at the bottom to raise the real estate value of Union Square. Moshe Azogui, the chief executive of Brack Capital Real Estate said, "15 Union Square will be woven into the urban tapestry of Union Square Park, evoking its colorful life and history. It will be one of the last great opportunities in New York City to own and live in a signature building with a view of this historic park and neighborhood." The architect, Eran Chen, and the developer, Brack Capital Real Estate, planned to keep the original stanchion structure as the selling point of the building. Now, the property has become the finest, most complex high-end condominium in the New York City.

Figure 25 Sheetrock Façade

Design Intent

Instead of demolishing the historic structure, new black zinc and glass was added to the façade to showcase the original five-storey cast-iron arches; an addition of six stories was constructed thereafter converting the building into apartments. This design melded the past and future, tradition and modernity. The combination of the design has marked down the most unforgettable structure in the 15 Union Square West. Eran Chen together with Perkins Eastman Architects came up with a design to take off the sheetrock façade to keep the original structure and to restore the cast-iron elements in order to recapture the uniqueness of the original building. The design was intended to keep the original structure visible to people inside the apartments and on the street.

“We knew this building had something special inside,” said Architect Chen. He expressed, “We had to decide what to do with it. Other developers wanted to demolish it. Not Brack. We all saw an opportunity to do something incredible here.”

Issac Hera, the Managing Director and CFO of Brack Capital Real Estate, said “It was clear to us that we owed it to New York and

to bring this back as much as we could. The trick was to make a modern home out of something historic. This project is so special, it will be hard to let go. I almost don't want to finish it. When something is this good, you just have to show it to people. That's all. You don't even have to talk about it."

36 new condominiums are uniquely designed with different configurations with the glass cubes to create livable spaces with terraces maximizing the view of Union Square Park. With the new extension and new façade being installed into the original structure, the architect did not ignore the original structure. The original elements are being recast and restored to revive the original Tiffany's spirit to the city in a 21st century way (Figure 26).

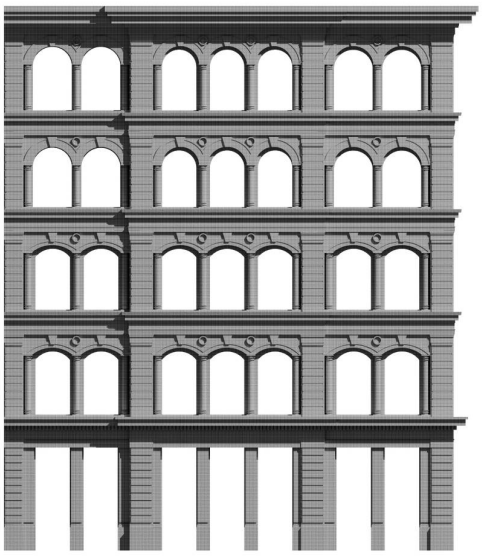


Figure 26 Original Structure

Project

The architects created giant 31-by-21 foot rooms with 16-foot ceilings and 17-foot low iron impeccably clear windows overlooking Union Square. For the first five floors, the architect also created a series of sky villas on top of the original building. Chen said "Because the brick façade was grandfathered, I was able to build a skin within a skin. The new glass exterior walls were built a few feet in front of the tall windows and walls of the original building. The intention was to ensure the curtain wall would not interfere with the 17ft tall historical arches. The curtain wall is approximately 17ft tall, 6-ft wide panels of low-E, low- iron glass, imported from Austria. The 1 and 5/8 inch thick glass and aluminum pieces weigh up 20lb per sq ft, about 2,040lb for a 17ft by 6 ft panel." Szendiuch, Principal of Perkins Eastman Architect, said, "We've been told, these are the biggest insulated glass plates ever used in New York City… They are that thickness to make them very flat and avoid waving reflection patterns. The panel height allows unobstructed visualization of the arches from the outside and provides clear views from inside the units. "Installation was a challenge; because they are very heavy and needed a special crane to pick them up… The result is stunning pieces of glass with

very little reflection and very little distortion.” Chen said.

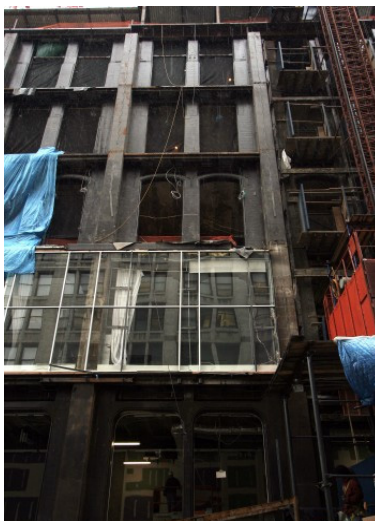


Figure 28

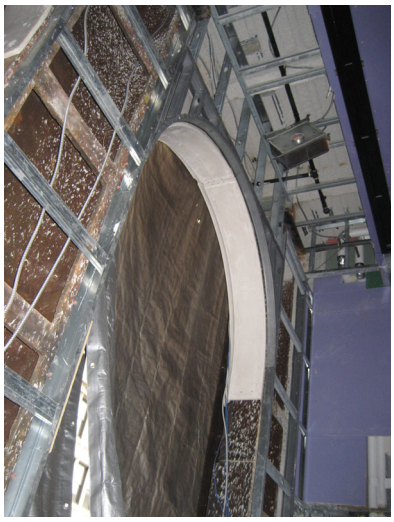


Figure 27

Figure 29

- Figure 28 - Existing structure condition before the restoration

  Figure 27 – Metal framing system
- **Figure 29** - Finishes after the restoration

  Figure 30 - Detail rendering of the façade renovation

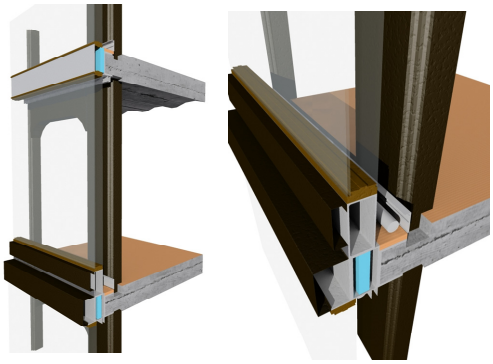


Figure 30

Figure 32 Construction processes

Figure 31 Glass Façade

- Figure 32- Construction processes from beginning to finish
- **Figure 31** - Existing structure which contains a strong classical style
- **Figure 31** - After renovation the building is modern and chic to fit with growing society

In support of the structure, according to the New York Times article in 1869, the cast iron framed structure sits on granite imported as a single slab in the mid-1860s, while the building was under construction, describe the structure as having massive 3ft thick solid granite walls that extends to a depth of 30ft beneath the pavement. Each floor was supported by the three rows of iron pillars. Glass for the windows came from Paris. "We had a very complicated demolition phasing and sequencing to maintain structural stability." Hera said. "Due to the fact cast iron cannot be reinforced with structural steel, new structural steel needed to be needled through the existing building to the cellar. The original cast iron columns were encased with concrete and rebar to allow the original columns to carry the additional six stories."

Moreover, Chen mentioned "Every site has a certain inherited character. You cannot change that. You have to have a deep understanding of what the site is and what it wants to be. We looked for the right glass that at night would be so clear; people walking by could see the stanchions. To make sure the residents could have some privacy, we put in shades that rise from the floor that are more opaque. The shades that come down from the top are not as thick. I wanted also to have as much outdoor space for the new apartments on top of the old building. It becomes a part of the park now." The units in the new construction have terraces and one of the penthouses has two terraces. For the lower floors, apartments retain the historical cast-iron structure.

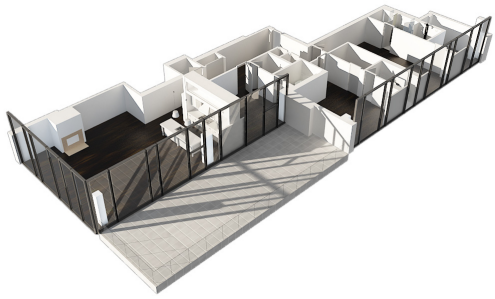


Figure 33- Upper Floor Unit layout with outdoor terrace (6th – 12th floors)

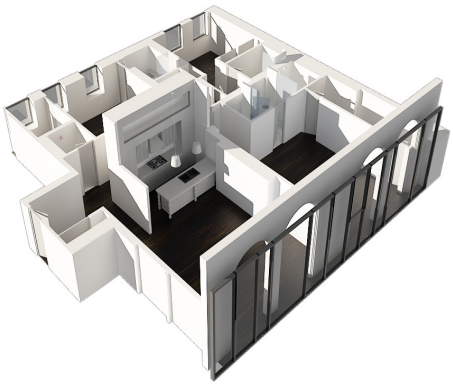


Figure 34 Lower Floor Unit with the 1**7ft tall cast-iron arches (1st – 5th floors)**

The Market:

According to Brown Harris Stevens, Real Estate, in a tough market, 15 USW is 45% sold out. The lower apartments fronting the park all sold from $4 million for a two-bedroom apartment of 2,700 sq/ft. Three bedrooms start at about $6 million. The 5,000 plus sq/ft home with five-bedrooms, six-baths, and 70 feet of windows facing Union Square Park is being marketed at $ 12 million (Figure 35).

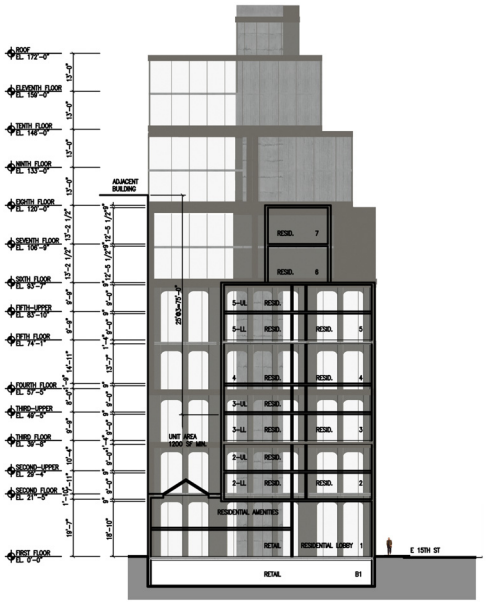


Figure 35 Building section

Conclusion:

Tiffany building is one of the typical case studies on how buildings are changing through the centuries, from function to façade. Modification and renovation for the building is necessary to keep the building safety, functional, and usable. Taking the example of Tiffany building, it is clear to note as soon as one function was closed down, another business was going to replace it. The interior layout would have changes due to the varied usages; so it is common to see interior renovation, but not for the exterior. Renovation for the exterior façade is more costly and has more impact for all of the building's users, including passersby. Even though the exterior façade is much more durable than the interior material, attrition will continue and the materials will eventually be torn off from the old buildings. As public safety is one of the main concerns, repairing or demolishing the entire façade to ensure the public safety is necessary. Sometimes, it would cost more to restore the façade with the original material, because the product may not be found in the market and a special order would need to be made.

15USW is different from the Caixa Forum and Santa Caterina Market. The architect took the entire original façade off, leaving only the structure. With the intention of

showing the classical arch structure, the architect used the glass façade to redress the building. This design technique is intriguing, since most of the structure would be hidden under the façade. As the technology for building is growing so fast, there are lots of better materials and fabrics being introduced that can provide better quality and features.

It is quite often one sees this design technique in the modern building, but it is hardly seen in fashion. In the past, garments needed to have the under frame to support the dress. As society is changing, people desire to have comfortable and simple wearable clothing. As one of the purposes in clothing is to cover the body, there is always a layering technique in fashion. This is also one of the biggest differences between fashion and architecture—architecture could be totally transparent as long as it protected the occupant, but as for fashion, because of the social manner, people would hardly wear transparent clothing.

As for building, in order to maintain the community modernization, the building can be dressed in different way to present a modern look. However, the building has to match with the entire surrounding and the market needs from time to time. To cope with the public needs and usage, building has to change its function more often, while the renovation of its exterior outlook can bring back the public attention and recall the memory of the building's history. In transforming the function of the building and restoring the former beauty of the structure and combining the modern architectural materials and design elements, 15USW's renovation has successfully brought up the real estate's value and achieves an impressive compliment to the cityscape. The building has not only reinstated the landmark for the Union Square but also reminded people of the history behind the building when they are looking at the original structure.

There is no doubt that building is changing through time in respect to the design methods and/or materials used. The prevailing concept that buildings must retain their exteriors when they were built may have to be changed following the successful transformation of historic buildings. Now, it is time to have a break-through for the architect to design buildings ready for changeability, either in the function or the façade, by employing the new building technology.

3.2.4 Case Study 4- De Baljurk

Location:	2511 AM Den Haag, Netherlands
Completion:	2005
Building Sq/ft:	8 buildings lots
Architect:	Archipelontwerpers
Original building:	Old Dwellings
New building:	Dwellings and shops
Reason:	Area revitalization

The Baljurk project is situated in the centre of The Hague (Baljurk means evening dress). The project is to transform the historical art nouveau facades into contemporary architecture. The location of this project is at the intersection of Kettingstraat and Achterom. The site used to be a modest stream with the organic flow of The Hague's rectangular layout, which has a smooth transition. For the last two decades, this place has not been perceived as an area of interest; yet, it became a perfect site in the revitalization of its neighborhood.

Archipelontwerpers has won the "New City Award 2005" competition by enhancing the urban city. The approach was to renovate the 8 shops in the historical centre by covering them with new modern facades (Figure 37). The property developer wanted to build something that was unique and which could be an icon in the neighborhood. The ground level used to be a retail space with an open floor plan, while the upper levels are for dwelling. The whole building is covered with a new glass curtain wall and is draped with golden steel mesh. Moreover, the designed sculptural mesh form is not only for the purpose of public interest but also to match with the surrounding Art Nouveau architectures.

Figure 37 - Framing system

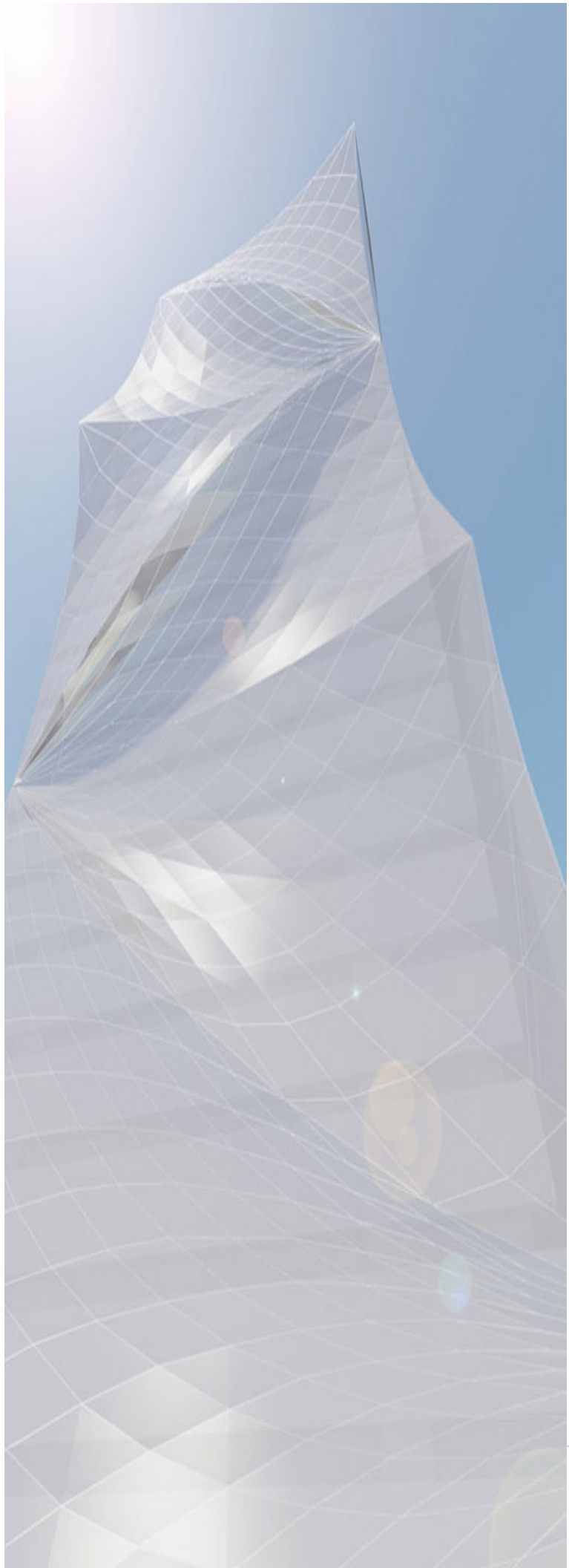
Figure 36 - New Facade

Conclusion

Building a golden evening gown is a wonderful example for changing a building's clothes. Having the structure frame to form the shape, the architects use the steel mesh on top to create the outer layer (Figure 38). It is similar to the projects of 15USW and UTS Tower, but it has a much stronger and more powerful character in a different way, achieved through the use of different materials. Actually, the architects have dressed the building in a marvelous style and in a unique way, instead of applying a simple wrapping around the building. Since most of the dwelling has been covered by glass wall as the extra layer of mesh, it also provides privacy for the occupants and filters the direct sunlight (figure 39) . In term of style, the building looks like Ginger and Fred building in Prague by Frank Gehry, except it appears softer with the fabrication. This building design technique has mixed the Art Nouveau and Deconstructivism style together with modern influence. It is not surprising to find similar building styles as they often influence each other. In the coming future, it is expected that a lot of historical buildings will apply this similar technique to redress their outlook.

Figure 39 Front View

Figure 38 Entry



3.2.5 Case Study 5- University of Technology Sydney

Building height:	123 m
Location:	1 Broadway NSW, Sydney, Australia
Architect:	Laboratory for Visionary Architecture
Owner:	UTS Union Ltd
Original building:	UTS Tower
New building:	proposed project
Reason:	Dated appearance

History

UTS Union Ltd was established in 1973 as a small institution with only four staff members to operate the New South Wales Institute of Technology (NSWIT). By the late 1970s, the UTS Union Ltd still had limited facilities at Broadway but it was a success in its expansion of students. In 1980, it received a Commonwealth Government grant of $2 million for funding the construction of the Tower Building. In 1988, NSWIT was granted University status and was then renamed as the University of Technology Sydney (UTS). The UTS Tower was designed as a "city university" to consolidate the dispersed NSWIT inner city multi-campus tertiary institution, meaning transport access was a priority over sprawling grounds, said Dr. Annette Salt.[17]

That the shape and construction of the building is derived from the idea at the wake of the 1968 Paris student riots, and that it was specifically designed to prevent students congregating, for conspiracy theorists, are both untrue.[18] The building construction cost $32 million in 1979 which was the most expensive building and was even higher than the Opera House in Sydney. Because of weather and water issues, the construction process was delayed; it took eight years in construction incurring an enormous amount of construction costs that almost doubled the original estimated cost and time. Yet, it became the tallest educational facility and an icon in Australia with its 33 levels rising 123 meters from the ground. Nevertheless, it was voted the city's ugliest building by the readers of Sydney Morning Herald.[19] (Figure 40)

As a result, it drove the studies of upgrading and improving the visibility of the façade into a sustainable design. The Laboratory for Visionary Architecture (LAVA) proposed a simple, cost effective, and easily constructed skin to transform the 1960's UTS Tower into a modern eco-friendly and remarkable iconic building in the city. (Figure 41)

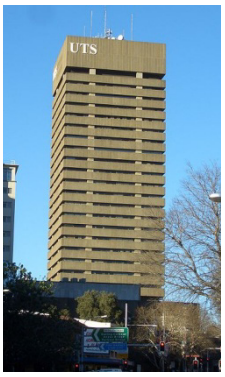


Figure 40 Old

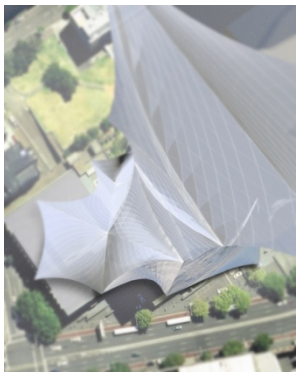


Figure 41 New

17 Chidzey, Alex. ""Did UTS Tower cost more to build than the Opera House?" Ashok, Glebe." Time Out Sydney. N.p., n.d. Web. 23 Mar. 2010. <www.timeoutsydney.com.au/thebridge/pleaseexplain/cost-of-uts-tower.aspx>.

18 Chidzey, Alex. ""Did UTS Tower cost more to build than the Opera House?" Ashok, Glebe." Time Out Sydney. N.p., n.d. Web. 23 Mar. 2010. <www.timeoutsydney.com.au/thebridge/pleaseexplain/cost-of-uts-tower.aspx>.

19 The Sydney morning

Design Intent

"The speculative project, 'Tower Skin', offers a unique opportunity to transform the identity, sustainability and interior comfort of the once state-of-the-art building," Chris Bosse, Australian director of LAVA, said.[20]

Figure 41 Daytime View

Figure 42 Nighttime View

Project

The project was designed to cover the existing building with an extra layer of lightweight composite mesh textile with high-performance photovoltaic skin. The skin concept was to use a transparent cocoon wrapped around the existing structure to transform the exteriror into a high-performance surface. The surface tension can allow the membrane to freely stretch around walls and roof elements achieving a maximum visual impact with a minimal material effort.[21] The skin can be easily repairable, removable and upgradable, and possesses the feature of a self-cleaning coating.[22] This design can help to reduce the structure's carbon footprint. The membrane can generate energy with photovoltaic cells, collect rainwater, improve day lighting and can also use the available convective energy to power the towers' ventilation requirements. Natural convection is able to draw conditioned air through existing rooms and vent it to the exterior to generate energy.[23] In the daytime, the tower appears as a dynamic sculpture, but the Tower skin appears entirely different at night by turning into a vibrant colorful art piece. (Figure 42) In addition, it can also serve as a media surface to communicate information to students just like a billboard.

20 Battenbough , Gemma. "UTS tower to get glowing eco-skin." Architecture and Design. N.p., 5 Feb. 2010. Web. 23 Mar. 2010. <www.architectureanddesign.com.au/article/VIDEO-UTS-tower-to-get-glowing-eco-skin/510726.aspx# >.

21 Battenbough , Gemma. "UTS tower to get glowing eco-skin." Architecture and Design. N.p., 5 Feb. 2010. Web. 23 Mar. 2010. <www.architectureanddesign.com.au/article/VIDEO-UTS-tower-to-get-glowing-eco-skin/510726.aspx# >.

22Quick, Darren. "Using a skin graft to give city eyesores an eco-friendly face-lift ." Gizmag. N.p., 11 Feb. 2010. Web. 23 Mar. 2010. <www.gizmag.com/tower-skin-concept/14154/ >.

23 Quick, Darren. "Using a skin graft to give city eyesores an eco-friendly face-lift ." Gizmag. N.p., 11 Feb. 2010. Web. 23 Mar. 2010. <www.gizmag.com/tower-skin-concept/14154/ >.

Conclusion

LAVA has created a remarkable innovative option to re-skin an old and unattractive building. This design can become a trend in the future in that the building can be simply wrapped up to transform its look. In that sense, buildings can also become fashionable by dressing them in new clothes. This new idea can change people's former perception of building as permanent and unchangeable. "The re-skinning technology could be easily applied to other buildings in need of a facelift such as the post-industrial abandoned buildings across Hong Kong and elsewhere. We can quickly and cheaply enhance their performance and aesthetics through this minimal intervention." [24] This new design can be regarded as a great invention in the architectural field to enhance any building in the world whenever people wish.

This is only the proposed idea, however, in the previous case study De Baljurk has shown that it is possible to wrap the building with an extra layer and the result came out fantastically. It enhanced the area and also created a stylish element for the building.

Moreover, this added-layer design will not solely be used for transforming the old buildings with their new look, but it can also be applied in the sustainability design. With the flexible material use, it can be easily changed, repaired, and transformed into a different form by manipulating the structure support. Thus, it can enhance the structure furthermore at night by incorporating different lighting systems. Nowadays, a lot of buildings are using softer and flexible materials to achieve shapes or forms that can also benefit the environment. In studying this building, it enlightens me that the structure frame and system are the essential elements to be incorporated into the building design in order to redress the building. After all, I considered that this case study is the closest idea related to what I am trying to achieve in my research project "Can Buildings Change their Clothes?".

24 Battenbough , Gemma. "UTS tower to get glowing eco-skin." Architecture and Design. N.p., 5 Feb. 2010. Web. 23 Mar. 2010. <www.architectureanddesign.com.au/article/VIDEO-UTS-tower-to-get-glowing-eco-skin/510726.aspx# >.

3.3 Conclusion

The most interesting issues for the life of a building actually lie with the human decisions at the time of creation, renovation, demolition or preservation—all of which have signified the building changes. It is commonly known that fashion is ever-changing and is changeable whenever people choose; versus, people's perception for architecture, that it is permanent and the building stands wherever it is built and however it appeared when it was built. In this research paper on "How buildings change?", I have adopted the basic characteristic of flexibility in fashion and the durability in architecture, and conducted case studies to find out the co-relationship between these two elements and the way to apply them together in my architecture project. To start with, I performed case studies and research on the history and renovation of old buildings. As a matter of fact, buildings will not be permanent without being properly maintained throughout time. In particular, the function of the building might change more frequently to cope with the needs of society and the market demand. Different functions might need different configurations and designs to accommodate with their special needs. For maintenance, it might not be possible to use the same material to restore the original façade. Due to these reasons, modification of buildings is essential throughout time which also indicates building changes. Through this case study, it is concluded that it is possible for buildings to change their look, just like humans change their clothes. Of course, the building change will take time and effort by the architects as well as the financial support of the investor. In these case studies, I found how the historical buildings changed their functions to meet society's needs, and what design approaches were adopted by the architects to renovate the existing buildings. Taking the role of an appraiser with the view point of fashion design, I also give my personal view of these building modifications to expose the link and connection between architecture and fashion.

The first case study of Santa Caterina Market in Barcelona, it was the most creative and straight forward design to renovate an existing building for accommodating with the urban context. The architects had placed a waving shape roof to cover the top of the existing market to produce an elegant look. This design approach is to add an extra element to decorate the existing building to give it an energetic feeling and created an iconic landmark for the place. In the fashion point of view, the existing historical building is

just plain and simple clothes, but with an accessory added, it can have a contrast effect and will produce a totally different look. The focal point is to reform with the addition element while the original elements remain to be the supportive part. Both elements are essential and can be applied in the appropriate portion without stressing on its balance.

With a similar design approach, Caixa Forum in Madrid is renovated by adding an extra element to make the existing building pop out. In this case study, my focus is placed on the materials used and the way that it is incorporated into the exiting building to dress it up in diverse ways. For fashion design, there are tons of fabrics that the designer can choose by mixing and matching them together to find the perfect harmony. However, not much building materials can be used in architecture that is durable enough to form the building envelope. The obvious point in this renovation is that the architects converted an unpleasant material- copper into an intriguing element and presented it as an additional extension of the building. Besides, the architects also dressed up the large plain blank wall with thousand of real plants to form a vertical garden. In this sense, the wall becomes a large living colorful picture with different species of plant. This is not only created an interesting visual effect for the visitors, but the plants also produce a better fresh air environment for the neighborhood. The materials used are perfectly matched with the function of the building and are absolutely going well together with those existing materials. The different elements are balanced just right together, unlike the design in Santa Caterina Market to have one stand out from the others.

Turning to the case of 15 Union Square West, it is one of the typical examples to demonstrate how the building adapts through time, by having changes in its function and appearance several times since it was built. The building transformation is a strong evidence to support the fact that building is actually changing through time to cope with the needs of the society. The transformation of the building appearance was started from a classical detail cast-iron façade in the early century to a simple sheetrock façade of “Less is more” styles in the 50s. At present, the building has again transformed into a modern glass façade which has incorporated the modern design method to catch up with the on-going society. Regarding the function of the building, it was originally designed as a high-end jewelry store but due to the security problem, it changed to a factory mill, and in the 50s, it was again taken up by a bank. The change of function was going along with the society needs. Now, it becomes a high-end residential condominium. In this case study,

we noted that even though the function and façade are kept on changing, together with the change in the interior layout and design, the structure element of the building has never been changed. With the several modifications in the past decades, the building is still keeping its own unique elements but the add-on value has made it more valuable in the society than before.

The last case study is UTS Tower building, which is a proposed project. However, this will be the future trend in transforming the existing building's appearance. This concept approaches the idea of dressing the building with clothes. This case study will bring us to an upper level to ask what will be going to happen to the building in the future. After all, this will be the most appropriate example of what I am trying to achieve in my doctorate thesis. The challenge in this renovation is to create a structure system to attach to the existing building by simply using the fabric to wrap around the building. It is an eco-friendly, the easiest, and the cheaper method to do the renovation.

How buildings change will all depend on how the building needs to be adapted in the society. The building change involves either the change in building type or the change in its outlook. The elements which are going to keep or demolish are all depending on their importance. Moreover, it is hard to transform an existing building to match with the modern design than to design a brand new one, as more research work needs to be done and careful consideration needs to be made on the existing structure elements. I agree with the view that a building can become interesting in its own way. It will always involve enormous work and is unnecessary to customize the building to meet a new technology. With the advancement in the technology, the building material becomes relatively lightweight and flexible over decade. "Let the technology adapt to the building rather than the vice versa, and then you're not pushed around when the next technology comes along. Spend more on basic structure, less on finishing, and more on perpetual adjustment and maintenance." (Brand 190) Regarding the building shape, it is easier to build in square which is the most efficient and produces best configuration of space for the occupants. "If you start boxy and simple, outside and in, then you can let complications develop with time, responsive to use. Prematurely convoluted surfaces are expensive to build, a nuisance to maintain, and hard to change." (Brand 192)

In these case studies and research, I have found different methods for renovating an existing building, from the simply one by adding additional element thereto, to the more complicated one on replacing the entire

façade. Moreover, it is also true that building can and will change eventually through time either with its building element or its function. Besides, the building changes are all proved to be successful in upholding their value, and to bring along more economic value to the area as a whole. Finally, it is more important to provide people with a new perspective that buildings can be changed to retain their attraction.

"A building is not something you finish. A building is something you start." (Brand pg. 188)

4.0 Three Fashion Techniques

In my case studies of fashion and architecture design, I have summarized three primary design techniques in fashion that could be applied to architectural form. They are wrapping, folding, and transforming. Wrapping and folding are techniques where one flat piece of material is converted to volumetric form. There are several buildings that have applied the wrapping and folding techniques. Transformation is a recent trend in fashion design that applies high technology onto the fabric to transform the garment into various forms. To adopt the same technique, I will apply building design elements that can respond to the user's preference, to create multi-use spaces to suit different occasions. The purpose of this doctoral project is to explore feasible new textiles and to develop transformational methods in the construction of residential buildings. Consequently, this will be a revolutionary form of the typical house design.

4.1 Wrapping

Wrapping refers to folding something tightly around an object so that it is completely covered or protected. There are usually two ways of wrapping things, which are either by continuity or discontinuity; this can also be regarded as either pertinent or irrelevant.

Wrapping is usually related to an object and can reflect the object's shape and characteristic. Wrapping can further enhance the characteristic of the object in terms of forms and shapes. People can simply use a piece of fabric without doing any sewing to produce various designs and form different styles. It is easy to change, adjust, transform, and compose by means of wrapping that can also appear in various shapes—rectangle, square, or oval. Wrapping does not necessarily use a continuous piece of fabric, and does not necessarily form the identical shape of the object. It can be in a totally different form or shape but can still preserve its purpose of providing protection.

A wrap is a piece of clothing, which the ancient people wore around their shoulders. It also developed into the building enveloped in architecture. For illustration, I have selected 'Shuhei Endo – Springtecture H', in which the building has a continuous wrapping effect which covers the entire building; as compared with 'Frank Gehry – Guggenheim Museum' which has various layers wrapped around its exterior. Referring to the fashion side, I shall explore the approach and the response of the fashion designers in relation to the new trend of wrapping garments.

Wrapping Comparison

Fashion vs. Architecture

Wrapping is more than just an external cover that is used to surround or protect the object. Through the study of fashion design, it is noted that the fashion designer, Yeohlee Teng, has a lead in the new trend of wrapping technique. She has made use of historical knowledge on the traditional wear in wrapping style of Greece, China, Japan, and Malaysia for further manipulating her unique designs to create a new trend for the fashion industry. Teng's garment have taken into consideration the architectural stand points regarding lighting and shadow, shapes, materials, colors, culture, and economy. These are the

primary design elements for architecture and yet applied to fashion design. In Teng's designs, she borrows architectural design characteristics in relation to the house as a shelter, or protection for human beings on a bigger scale; then, she took these elements and scaled them down to design the garments to fit the human body.

Wrapping technique in fashion design deals with the exterior form and internal space between human body. The movement of the body is the critical point to justify the spatial experience. For architecture, more considerations are needed regarding the function and the usage of internal space. Moreover, wrapping can enhance a dynamic form of the object, and its design will directly affect the shape, function, and usage of the structure.

In one of Teng's collections on zero waste, the design can be categorized as a continuity of wrapping as the whole piece of fabric is used to wrap around the body with minimal cutting. Unlike some other garments with several layers, this can be regarded as a discontinuity of wrap.

Nevertheless, the garments still serve the same purpose for body protection. The use of zero waste approach may be a better solution in the architectural building rather than for clothing for the human body. In contrast to the architecture of Shuhei Endo's Springtecture H, [insert subject] is the typical sample illustrating that function follows form in which the interior layout is bound by its exterior shape. In this design, has created a dynamic form but the interior space is not as functional as it was originally intended. Unlike fashion design, architecture cannot be merely focused on the design of an exterior look without regarding its intended function. Nevertheless, Springtecture H is one of the perfect examples of architecture with functional wrapping techniques applied that meet both requirements of beauty and practicality. Regarding the Guggenheim museum and layer wrapping, the building does not have limitations or regulations to reflect the interior layout. It is more flexible and appealing when looking from the exterior into the interior space.

In studying Teng's fashion wrapping technique, I noticed that most of her design approach is derived from the study of architecture characteristics. We may take the softest and smallest scale of the fashion design to apply them into a bigger form for architecture. We can mix and match different wrapping styles to create a unique modern style for architecture. This is

similar to what Teng used when she mixed a classic shirt under a kimono coat worn with a sarong. The advantage of wrapping is to enhance the object by playing around with the proportion. In addition, the wrapping garment has to deal with body movement; while architecture needs to deal with the user's access movement and climate conditions. Finally, various uses for fabric wrapping create different identities and effects for architecture.

4.2 Folding

Folding involves a mathematical approach; it is highlighted by the discipline of Origami.[25] Folding in architecture can create spatial, structural and organizational forms for an object that can be applied to a variety of geometric shapes. The folding technique can be used in a number of methods such as: press, pleat, score, cut, pull up, rotate, twist, revolve, wrap, pierce, hinge, knot, weave, compress, and unfold. (Vyzoviti 9)

To summarize these methods, they can be broadly grouped into two main categories, namely repetition folding and random folding.

Repetition folding refers to the folding in sequence with repeating similar geometric patterns to create an organized form. Repetitive paper folding evolved initial intuitive responses into primary techniques: triangulation, stress forming, stratification of folds, folds within folds, or patterns like stripes, spine curves, spirals, or meanders. (Vyzoviti 9) Random folding refers to the folding in various ways that do not need to be in a particular order or pattern to form an object. In this regard, there are both advantages and disadvantages that can appear to be a creative and unexpected spatial form, or it can end up being a mess with no order at all. Folding in architecture manages complexity by integration of disparate elements into a heterogeneous yet continuous system. (Vyzoviti 12)

Many architects and fashion designers find new and creative ways and methods in designing their objects. However, simple folding is the more popular method used by designers to study and try out. Fashion designers would like to take up processes in experiencing the folding technique, since the garment is much easier to construct than that of the building. Folding can create

[25] Dent Andrew, "Crease and Fold"

a better visual effect than a smooth surface—the reason garment designers apply this technique. Taking the example of Issey Miyaka, his work not only applies the folding technique but also other methods like pleating. In this respect, his work creates both an elegant visual effect and a functional connection with the human body.

Since the 20th century, many new architecture buildings have been using the folding technique to create space, even sometimes incorporating the technique as part of the structure. Given the success of the folding technique in fashion design, I would like to explore, in this research project, the feasibility and benefits in the architecture field by applying the folding technique.

Folding- Architecture vs. Fashion

Although Issey Miyake and Peter Eisenman came from different backgrounds and cultures, both of them share a similarity in a design style of folding. Issey Miyake's folding technique is confined to the spaces between the garment and human body. He used to design garments that reflect body scale and movement. One can always find the sense of smoothness, playfulness and flexibility in his designed garments. Peter Eisenman's folding concept is more concentrated on human scale, nature and human culture. Using the continuity of folding technique, he has created various dynamic forms of buildings that can be easily reflected with its form. Each of the folding works bore its own particular idea, either representing the human scale or the spatial experience.

Nevertheless, his building design gives one a different sensation from Miyake's garments which can produce a sense of edginess, seriousness, and stiffness. In the designs of Miyake and Eisenman, both illustrate the folding technique applied to the form and material used in respect to the human body. This is not only judging from the aesthetic point of view but also for practical use. However, if Miyake's design can be applied into Eisenman's building design to smoothen out the stiffness of the outlook of the building, or to use a different material, the design can be perfectly matched.

4.3 Transformation

Transform means a change in the form, appearance or structure of an object. With nowadays technology, transformational materials undergo a physical metamorphosis based on environmental stimuli. This change may occur automatically based on the inherent properties of the material, or it may be user driven. Like intelligent materials, transformational materials provide a variety of benefits, including waste reduction, enhanced ergonomics, solar control, illumination, as well as unique phenomenological effects. Transformational products offer multiple functions where one would be expected, provide benefits that few might have imagined, and help us view the world differently. [26]

Transformable encapsulates principles of both Deconstruction and Reconstruction, like the zips, snaps and fastenings in garments, fundamental devices that make the architecture design transformation possible. [27] Architecture transformation can be carried out through either easy processes or complicated processes. Easy processes may involve the simple transformation by applying some manual efforts such as reversing one side to the other, or detaching one part to change its outlook. Complicated processes may involve more layering with the help of advanced technology to transform the object. By changing the outlook or the form, the object may adopt a multifunctional use and serve different purposes. With advances in technology, transformation has become the hot issue in the 21st Century.

In the past, many people wanted to apply the transformation idea, but it was hard to succeed due to limited resources. For instance, garment materials had been transformed in building environments such as the tent. Hussein Chalayan, a fashion designer, in his earlier work—"before minus now" collection—had transformed a café table into a wearable skirt manually. Through research and making good use of technology, he invented an automatically transformable garment. His invention is a break-through in applying technology to the design to improve human life. Transformation will be an upcoming trend in architecture though it is not yet commonly applied. But architecture

26 Brownell, Blaine. Transmaterial 2: A Catalog of Materials That Redefine Our Physical Environment.. New York: Princeton Architectural Press, 2008. Print.

[27] Bradley Quinn "Techno Fashion", Berg, 2002

transformation can be found in a number of smart houses, automatic shaded devises or rotatable houses. This is a sign that architecture with an advance in technology and specific designs has been proceeding towards transformable houses according to users' preferences.

Transformation- Fashion vs. Architecture

In comparing Gary Chang's Suitcase House with Hussein Chalayan's garment, they are both sharing the same idea of changing in form and appearance according to different occasions. Suitcase House changes its interior spatial environment according to the user's needs. It is easier and handier in its transformation, by pulling up the partition and using the underneath spaces. However, this transformation is just limited to the interior and cannot be applied to the exterior outlook. In contrast with Hussein Chalayan's transformable garment, Suitcase House keeps on changing to represent different time periods. On the other hand, Chalayan's garment is controlled automatically by microchips, and is compiled with hundreds of wires and batteries inside the garment. This complicated process of small-scale invention is inconvenient and uncomfortable to put on a human body. Alternatively, if it can be applied to a bigger scale such as for a building, it will be a perfect transformation to reflect the nature of the user's preference. Moreover, fashion can always have a leading role in design trends since fashion will be easier to construct and explore. By taking the existing knowledge and invention, it is feasible to apply Chalayan's design elements into an architecture form. By combining the idea in Chang's Suitcase House and Chalayan's garment, the result might be a totally transformable architecture form from interior to exterior.

5.0 Integrate Fashion Design into Architecture Form

Fashion design is ever changing and one can hardly catch up with the new and intriguing design stuffs. Architecture design is also constantly changing following in the steps of fashion design, although it may not be at the same speed. During my internship practice with Perkins Eastman in the New York office, I learned, explored and experienced a great deal of things regarding both aspects, including innovative designs, materials used, practical skills and exposure to culture.

By comparing the most intriguing boutiques in New York, I have a clearer sense of how architecture and fashion can influence each other and how they can be integrated as a whole in respect to materials used, lighting systems, movement of circulation, and spatial transforming. In general, there are more materials being used in interior design because we don't have to consider much durability in the change of climate. Moreover, interior design can be more flexible than architectural design. Although there is not much changeable architecture, I still managed to find some typical cases for my research in this area. With the selected study cases of boutique stores in New York City, it was not difficult to establish a strong relationship between architecture design and fashion design. Studying the relationship of different design techniques both on materials used and spatial designs of these boutique stores, one definitely notices the main design elements in the connection between architectural design and fashion design.

All the cases covered in my research are designed by architects and not by interior designers. Therefore, the form, shape, and material used have a very strong vocabulary. Usually, the interior design will not be substantial in proportion to the architecture project. Since the building materials are fixed and durable in the structure, the boutique store gives customers the feeling of shopping externally; yet, it has shelter for protection. Furthermore, it is also amazing to see and feel a building within a building, and it can provide customers with a comfortable shopping environment. Finally, it's become a successful marketing technique to advertise an international brand by means of fantastic store design.

From an architectural point of view, the similarity that can be drawn between these boutique stores is to make use of the spaces to create a significant sculptural form with the purpose to draw people's attention and interest to visit the display items at different floor levels. Regarding fashion design, fashion designers are creating voids and gaps between garments and body movement. Nowadays the fashion trend is not less is more, but instead draws upon using multiple dimensions in the design. Therefore, the form is going to be more organic and sculptural. People are more fascinated with something that is transformable, changeable, and unpredictable in design; instead of having a straight-forward design. Using the examples of Prada's and Amani's boutique stores, both use one big sculptural element to make the store more attractive to shoppers. In comparing these two stores, I considered that Amani boutique is more intriguing than Prada. The sculptural form gives the customers a great experience combined with the atmosphere and color in the store. These are all essential as a whole in the design consideration. The architectural design is somewhat like the design of clothing in that it is required to fit in with one's personality, color mood, and scale.

The minimal design in Hugo Boss and Alessi are both use great design technique with a little touch on lighting that forms another source of interest in the store. Lighting design is one of the major factors to determine the mood of people entering the stores. Playing with lighting is another design technique to utilize form by adding a little touch up in detail. With new technology, the lighting can be changed according to the weather, brightness, and even with the change of human moods. In Hugo Boss, the store uses its own simple and unique design to wrap up the store and could still retain the original style of the area. The change of lighting interacts with different timing and seasons to adjust the store's atmosphere. This is one of the greatest and easiest designs, applying a changeable design concept; for instance, when one wears red versus black, it gives one a different sensation.

The continuing form and element is another technique, which is adopted to keep the shopper's interest and to lead then on their way to visit different floor levels or other areas of the boutique. It is hard for customers to go everywhere in the store without some elements leading the way. It is not necessarily linked by the form but possibly by color, or lighting, or something

relevant to create a focal point for the viewer's vision. For example, it is not necessary for people to wear the same sort of dress all the time in order to keep the overall look together. However, they can mix and match with their shirts and pants, or match colors to present a fresh outlook. This is similar to architectural design.

After all, the boutique stores selected as my case study have their own characteristics and have successfully promoted their brands to the public. Nonetheless, there are always pros and cons in using different design techniques; it is hard to judge which boutique store has a better design or which design techniques will work better in the design to link up with architecture, fashion and humans on the whole. Through the analysis of these cases, the architectural and fashion design elements and techniques are well coordinated together in terms of spatial function regarding human bodies and garments, human activities and architecture, the mood sensations induced by colors, and use of sculptural forms to draw people's attention. Obviously, these are the considerations and techniques to be used in architecture and fashion design.

6.0 Wrapping

7.1 Case Study 1
Yeohlee Teng

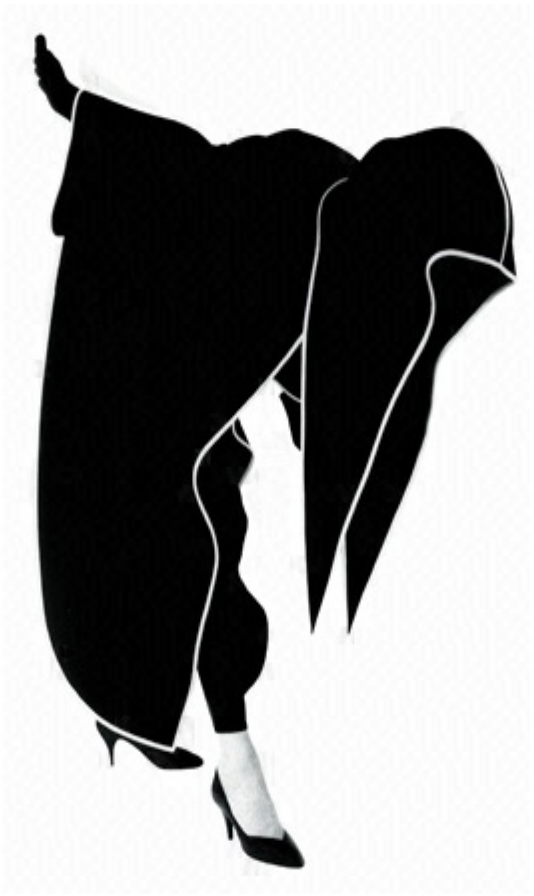
7.2 Case Study 2
Shuhei Endo - Springtecture H

7.3 Case Study 3
Guggenheim Museum Bilbao

7.4 Case Study 4
Hugo Boss Store

7.5 Case Study 5
Longchamp

7.6 Case Study 6
Giorgio Armani



6.1 Case Study 1- Yeohlee Teng

With Chinese heritage and Malaysian upbringing intercrossed with a Western education in New York at Parsons School of Design, Yeohlee Teng is one of a few designers who have avoided fashion exaggeration to engage clothing in space on the body. Teng believes that "Clothes have magic. Their geometry forms shapes that can lend a wearer power".[28] Teng remarks that clothes can be animated according to human body movement upon sitting, standing and walking. People's gestures are equally affected by design decisions. The shape and form that people wear also affect their movement. Teng pays much attention to all these elements and is careful not to waste fabric material.

Teng's design theory of simplicity, "Less is Moorish", becomes her rule of thumb in her design approach, that is: to have the basic concept of shape, volume, function and proportion to meet with the basic protection for their body needs. With the fundamental geometric form to structure the garment, she always relates her design with architecture. She says, "Fashion and architecture operate along the same principles. It has to do with appreciation of material, the ability to organize information and how humans function within their environments. Where they enter, exit, and congregate. Egress is therefore an essential consideration for both disciplines." [29]

Her collections demonstrate how she integrates architectural characteristics into

28 Major, John S.. Yeohlee - work: material architecture. Mulgrave: Peleus Press, 2003. Print.

29 Major, John S.. Yeohlee - work: material architecture. Mulgrave: Peleus Press, 2003. Print.

garments. She has incorporated into her design aspects including light and shadow, culture, colors, materials, functionality, and economics.

Fall 2001

Jean Nouve and, Ortiz Echagüe are reference points for Fall 2001. The fabrics reminded Yeohlee of geometric forms that are decorative elements prevalent in Moroccan/Islamic culture. Jean Nouvel's use of glass and screens at the Institute du Monde Arabe and the Cartier Foundation in Paris were a source of inspiration for their play on ***light and shadow*** *and for what is* ***concealed and what is revealed****.*

Light and shadow, concealed and revealed are the conceptual ideas for this collection. These are the essential elements in designing a building to create a comfortable and private zone for the user. In this collection, concealed and revealed are interacting extremely well together, the proportion of the design involves a high waist and a long and lean line which brings out a nice human figure; yet, it does not have the baggy look. I appreciate how Teng has incorporated her Asian background in her design. The mix and match of clothes with a classic shirt under a kimono coat worn with a sarong are three totally different style and culture pieces combined together to form modern casual wear. Moreover, the extra draping fabric creates a nice effect of light and shadow with the body's movement. Her wrap around garment allows the fabric drape to retain, naturally, an elegant shape and create a spatial gap between the fabric and the body, casting different lighting and shadow with different body movement.

Spring 2007

Yeohlee's focus is on ***reducing the number of fabrics used*** *and exploring to the maximum the innate potential within each of the materials. Yeohlee chose natural fibres as her core medium with an abundance of cotton, linen and silk. The weight and weave of these yarns are what gives the materials their*

structure, lustre and sheen. The color palette is light and bright, consisting mostly of unexpected textures in white and black.

The inspiration for the YEOHLEE Spring 2007 collection comes from two sources: her involvement in an unprecedented exhibition titled Skin + Bones : Parallel Practices in Fashion and Architecture at the MOCA in LA and her visit to the Schindler House while out West. "I am mining LA of the 20's and the 30's, particularly the Schindlers and their Bohemian lifestyle exemplified by the communal living at the Studio House on King's Road.

This is one of the cleanest and most stylized collections, which meets both with functional and elegant needs. The "Yarn dye silk linen tank dress with white silk organza loop" is a simple wrapping technique, but with her stylized cut of the fabric, it creates a unique and modern form of wrapping style. Moreover, "A white Teflon Egyptian cotton harness dress" is a creative gown, the length controlled by holding it up on the shoulder; it also creates an unexpected silhouette for the garment. Thus, Teng's creation provides an extra layer, Teflon, on the fabric, which has a water and stain resistant coat to provide the user an easier time wearing white fabric.

Fall 2007

*This season Yeohlee references Antonio Gaudi, **a structural** genius, who created undulating forms that look so organic and free and yet were constructed with the utmost discipline. By choosing an array of textural materials such as felted woolens, membrane-like cotton, featherweight silk organdy woven with undulating velvet stripes and metallic taffetas embroidered with a granular* rice *pattern, Yeohlee's volumetric forms possess three dimensionality with little rigidity. The garments are further enhanced with a subtle color palette of mostly black, white and grey.*

This collection is based on Gaudi's architecture work; however, it is not strongly demonstrated on the garment. Gaudi's work is not only known for its organic free form and utmost disciplined structure, but also his colorful detailing of ceramic tiles with recycled broken tiles, and other materials used. In this collection, there is no doubt that the structure of the garments is great, signifying Teng's style. The structure formation plays with curves and volume, which creates organic shape for the garment. However, from my point of view, it may be too plain and not challenging enough to represent Gaudi's work. I would regard the clothes to be a combination of different left over or cut-out pieces with innovative fabric to decorate the form of the garment.



Fall 2009

COUNTING …

We all count. How many looks, how much time, how much? Drawing on the ***principle of economy*** *in design, fabric and execution, YEOHLEE'S Fall 2009 collection was created with* ***zero waste****. Every inch of the fabric is used; not one scrap of material is wasted. Crafted from the most utilitarian of fabrics, the worker group propels the suit into fresh territory, equipping the worker with a modular and functional versatility, a necessity in today's environment.*

Zero waste idea is a perfect term to fit with this century. It is also challenging to create a garment in shape without cutting out the unnecessary pieces. Teng has created a great collection to successfully resolve the problem by simply draping down the unnecessary pieces as decoration to add some shape and volume to the garment. This is Teng's typical simplified design style. Nevertheless, it is questionable why we would rather have extra unnecessary fabric on our bodies than to simply cut it off to minimize the load on the body. One-size fits all and zero waste is in line with the ideal economic theory for current fashion design. Nonetheless, the garments may not be able to outline the nice shape of the wearer's body.



6.2 Case Study 2- Shuhei Endo

Springtecture H

Shuhei Endo was born in 1960 in Shiga Prefecture, Japan. He was graduated in 1986 from the Kyoto School of Art and founded his own firm, Shuhei Endo Institute, in Osaka in 1988. He has introduced the new concept "Paramodern" in architecture. "Paramodern" architecture is based on the continuous forms in Renmentai, the Japanese's cursive script, which represents the endlessly changing and the undefined ways to form its own shape. These strips formed the main construction and did not have substantial differences to dominate each other within the space of each element. Endo's structure of continuous surface forms the outer shell including the floor and roof that shows no boundaries between each element. The strip can be used to separate the interior and exterior by simply folding it up to match with the site and function. Endo's concept of paramodern architecture can be carried out with two different construction methods: "Halftecture" and "Rooftecture". The former mainly related to open spaces, while the latter replaces the walls and roofs by continuous ribbons of steel sheets.

Moreover, Endo uses steel as a unique choice of building material, which is the important element to shape the building appearance. The design can also reflect the architect's personality and cultural background. It is not difficult to image that a simple sheet of steel is used to wrap around the building to form the specific shape of the building (Figure 43).

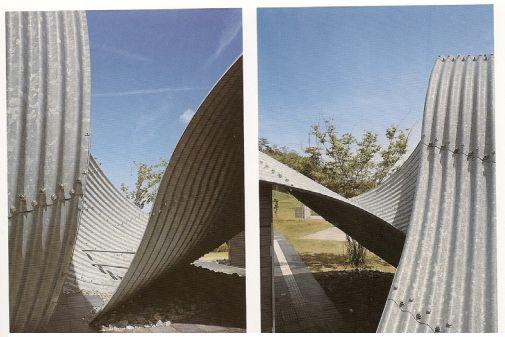


Figure 43 Corrugated metal

Endo's distinctive use of steel as building material together with the specific building form has become his personal signature and style. His special design has a profound influence on the contemporary architecture. In his design, Springtecture H, he has turned an unattractive facility into a highlight of the place. His remarkable design in the public washroom is located in a small park in Singu-cho, Japan within s a densely built-up area in the mountain of Hyogo Prefecture (Figure 44). The building only occupied a small area of 119 square meters; yet, Endo has demonstrated his design ability to change it into an important architectural landmark within the limited area space, financial budget and unnoticeable facility. The structure takes the basic form of a large spiral and dramatic form that arises up from the ground (Figure 45). The design does not only fit well into the landscape, but the exposed part also becomes a sculpture form (Figure 46).

By using the simple strip of steel, it has created a strong architectonic form. After all, the choice of steel building materials is considered to be economical, long lasting and recyclable. Glass is the secondary material to define the building's function. The two materials combined together to create an open and close spatial experience through the continuity of the steel sheets.

Figure 44 Entry

Figure 46 Side View

Figure 45 Front view

The continuity of the steel sheet wrapped the building as walls, ceilings, and floors. Endo said " Springtecture architecture is not composed of roof, wall, pillar girder and slab. It is another architecture completed by original thought." Having the function of public washroom, it is essential to provide people with convenience, openness, security and privacy for the public users. The challenge in this design is to control the openness and closeness of the environment, and it can still function well (Figure 47). Endo has separated the washroom into three parts for the janitors, men and women, but there has no clearly sign to indicate the respective entrance (Figure 48).

The continuity of wrapping idea in this case study has proven that enhancement can always be made in respect of the characteristic of the building in terms of forms and shape. By adding the special building materials, it can produce a better effect on the lightness, flexibility, and durability.

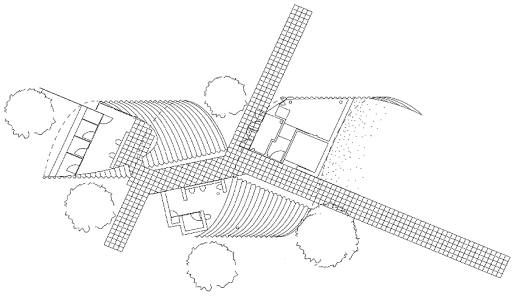


Figure 48 Plan View

Figure 47 Back View

6.3 Case Study 3 - Guggenheim Museum Bilbao

Location:	Bilbao, Spain
Architect:	Frank Gehry
Date completed:	1997
Historical style:	Modern
Bldg. type/function:	Art Museum

Construction materials: Steel frame, Glass, Stone, and Titanium Sheathing

Frank Owen Gehry's design philosophy is expressed in his statement, "I approach each building as a sculptural object, a spatial container, a space with light and air, a response to the context and appropriateness of feeling and spirit."[30] His unique style of warped forms of the structures is a typical expression of the Deconstructivism, which does not require to follow a particular designed form or function, but rather to reflect the specific social ideas.

"Painting had an immediacy which I craved for architecture. I explored the processes of raw construction materials to try giving feeling and spirit to form. In trying to find the essence of my own expression, I fantasized the artist standing before the white canvas deciding what was the first move. I called it the moment of truth." – Frank Gehry

Guggenheim museum is one of his remarkable works, which has attracted thousands and millions of visitors to visit

30 "Frank Gehry - R 20th Century Design." R 20th Century Design. N.p., n.d. Web. 12 Oct. 2009. <http://www.r20thcentury.com/biography_detail.cfm?designer_id=58>.

the city. This has exemplified the contribution of a building to the process of urban transformation and economic revitalization. Besides, it also signified the first step in the large redevelopment project in Bilbao's former trade and warehouse district that is located along the South Bank of the Nervion River of Spain. Changing from an architecture form to an exhibition display function, the museum has demonstrated a sense of funkiness and playfulness. The organic shape of the design needs to be totally matched with the function of building. In this project, Gehry has made a lot of considerations on the history of the place, urban context, and the form of the building.

The museum composes of 297,000 square feet incorporating an existing bridge that has connected the nineteenth-century city to the outlying districts.[31] As the museum is surrounded by a lot of attractions, it became a main challenge for Gehry in his design work. On one side, it is the waterfront of the river, Nervion, which is 16 meters below the level of the city. At the other end, there is a heavy traffic bridge, La Salve Bridge, and a high raised tower is right next to it. Gehry overcame all these problems and made a nicely balanced sculptural form that shows ships sailing on the river and flowers handing in different angles to celebrate the day in the middle of the center. Along the slope of the roadside, Gehry created a wide staircase to connect the museum to the city. At the end of the staircase, there is a big dog status accompanied with thousands of flowers, which has become a focal point and provided guarding at the entrance of the museum (Figure 49). Gehry's solution has been completely fulfilled the both needs for meeting the problem arising from the riverside and the roadside.

Figure 49 Site View

31 Friedman, Mildred S., and Michael Sorkin. Gehry talks: architecture + process. New York: Rizzoli, 1999. Print.

Furthermore, the sculpture forms of the building and the choice of building materials have been fully matched and in line with the neighborhood buildings. For instance, he used limestone to match with the tradition building, Deusto University, (Figure 50) which is located at the other side of the river. He has also created a perfect match with the sandstone façade of the University. While the titanium panels gives the building a futurist feeling even for the upcoming future. According to Randy Jefferson, who was a technical member of the Gehry office, the titanium surface on Bilbao is only about 0.38 millimeters, giving a thickness of several pieces of paper. Each sheet is approximately two feet by three feet jointing together with a traditional locked seam. The edges are very stiff because of the locked seam, and there's a clip that sits in the fold to hold the titanium on the wall.[32] Thus, by incorporating the glass wall, it can provide better sunlight for the atrium. Yet, the glasses also have the effect to reduce the heat and the radiation.

Figure 50 Surrounding Environment - Front

Figure 51 Surrounding Environment - Back

The central atrium rises 164 feet above the river and fills up with light through the sculptural skylights. The atrium in the museum creates a sense of inside-out for the museum. The concrete forms of the curves wall also give a different sensation for the space. Concrete usually produces a heavy and massive feeling and in this case, it gives the softness and fits well within the interior.

The interior design does not reflect the outside metallic looking although it is composed perfectly with the metal framing and the stone work. Moreover, the exterior form does not limit to the exhibition space, but it can create uniqueness for every single room of the

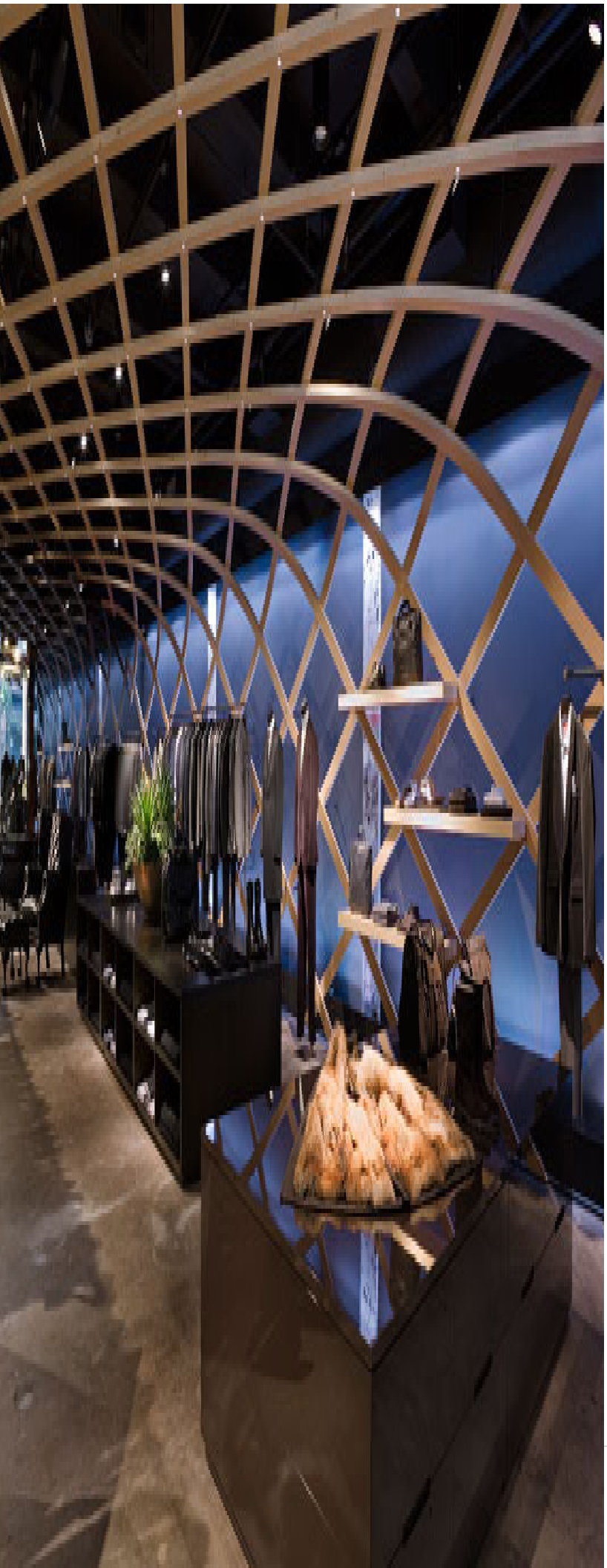
32 Friedman, Mildred S., and Michael Sorkin. Gehry talks: architecture + process. New York: Rizzoli, 1999. Print.

exhibition. It is unlike most of the museums having rectangular form for every single room. The galleries corresponding to the direction of the exterior are in rectangular shape and are for exhibiting the traditional modernist work from the Guggenheum collection. While the asymmetrical galleries with curving walls devoted for the commissioned works and temporary exhibitions.(Figure 52, 53)

Figure 52 interior

In the case of Guggenheum museum, the exterior shape of the building does not affect the interior layout of the space. The façade has various layers wrapped its exterior and it can be one of the typical wrapping example to illustrate that wrapping does not need to be in the continuous piece of material or shape, but it can still preserve its protection purpose in a dynamic form.

Figure 53 Interior



6.4 Case Study 4 - Hugo Boss Store

Visited:	November 25, 2009
Location:	401 West 14th Street, New York
Function:	Retail
Architect:	Meteo Thun, Milanese
Client:	Hugo Boss AG
Program:	Transform the beef grocery store into a fashion trendy store of 4,000 sq foot space.

Mateo Thun- “In all projects, I try to discover the soul of a place… Often it’s as easy as leaving it as it is. Any new element should emphasize the spirit of a site rather than overwhelm it”.

The store is located in the Meatpacking District, where there were hundreds of slaughterhouses and industrial processing plants in the past. Now, the area has been converted to a trendy retail neighborhood. The design concept for the store is to preserve the original industrial feeling. Therefore, the structural columns and the walls would remain the same as what they were in the olden days. In order to convert the store into a cutting edge retail space without removing the old features, the architect had to add some new elements while retaining its original appearance (Figure 54). In this design, the architect used a bird’s net idea to construct the structure. The bentwood oak rises from the floor to wrap up the wall and ceiling. Thus, it has created intimate shopping enclosures—a fantasy to the shoppers. The back of the net frame is supported with steel piping. At the time of my visit, I was fortunate to see how the salesman reconfigured the shelves according to the needs of the display. It is interesting to note that all the fixtures are moveable and the shelves can be plugged

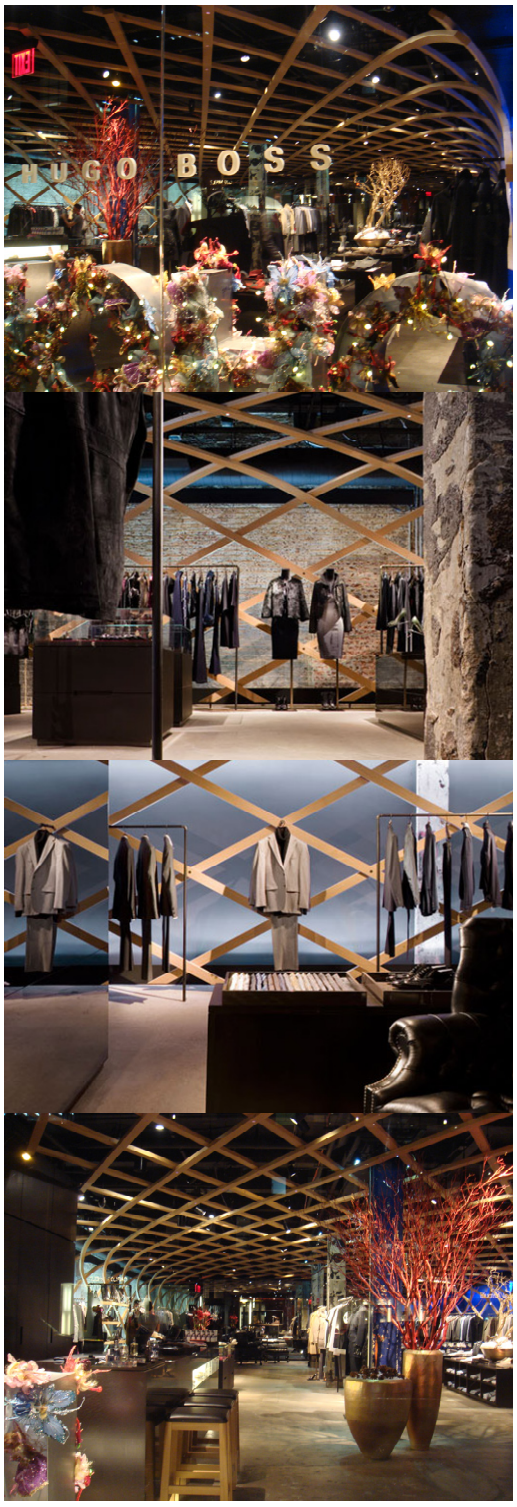


Figure 54 Interior Design

into the sockets, which are attached to the wood net to produce a feeling of a floating wood frame.

To preserve the original industrial feature, the design element for the showcase had to be simple. This was done by adding the LED lightings, so as to bring liveliness to the space. I also noted that there are many little holes on the wood structure with the lights coming through. This design has added more details and has softened the massiveness of the structure. Moreover, the design has different lighting in the interior in that one wall is in dark blue color versus the other side in light blue. Furthermore, the lighting coming from the little holes of the structure is soft and constantly changing colors, too. It is also interesting to learn that the store has used ambient lights, which can change brightness according to the outside condition.

I like the overall environment of this store. Even though it is a simple store with one floor of retail area, and there is no dramatic floor or ceiling changes, its elegant design impressed me much. Although the original sketches featuring the brick walls and columns had to be preserved in the building, the design still presents a sophisticated appearance for the shoppers. With the bird's net structure system, it not only creates a visual effect, but can also be applied to the display element for the showcase of merchandise. For Issey Miyake's store, I had the feeling that there was a lack of connection between the architecture elements and the clothing. This is similar to most other boutiques in that they commonly use simple metal stands to display the clothes. However, it is different for Hugo Boss because the store uses the net structure instead and the simple metal stand becomes unnecessary in the design. Generally, it is more difficult to design a structure that can serve many purposes rather than the design for a decorative piece.

6.5 Case Study 5 - Longchamp

Visited:	December 06, 2009
Location:	655 Madison Ave., New York, NY10065
Function:	Retail- Hangbags, Luggage
Completion:	May 2006
Architect:	Heatherwick Studio- Thomas Heatherwick
Program:	Remodeled a 1936-built building in Soho, for 9,000 square feet surface area, featuring ribbon-like installations that connect the floors and the street level.

Philippe Cassegrain - “This project is in no way a new sales concept to be deployed the world over. It is, however, a unique architectural ensemble to be appreciated as a one-of-a-kind event.”

Background

Longchamp was established in Paris in 1948 as a creator of fine leather and high-end luxury goods. It is going to open the chain’s 100th shop in Soho in a 1936-built building. Cassegrain planned to celebrate this occasion, so he hired Thomas Heatherwick to design the new store. Heatherick is known for his innovative use of engineering and materials in public monuments. Heatherwick has remarked, ” People typically don’t like to mount staircases in retail stores to get to the next level. So instead, we created a steel landscape, with ribbons instead of typical treads, to draw visitors up to the selling space.”

Similar to other boutique stores, the interior design and the exterior of Longchamp has presented two different feelings. The design is modern, chic, and timeless; yet, it still maintains a classy feeling to match with the products of the store. Visiting this store gave me a better understanding of how the whole ribbon floor details are holding and supporting. The ground floor is the area for display and registration. It is a bit dark but provides an interesting spatial experience. Upon entering from the main entrance, the staircase sculpture almost overwhelms the interior and automatically draws the shoppers’ attention to check out retail area on the second floor. The overall sculptural form ties up the products, architectural elements, and the shoppers as a whole inside the store. (Figure 55)

Figure 55 Staircase

As I visited the store at night, I noticed that the store had a high ceiling, but I didn't realize that it had a skylight above until I read an article about the shop. The whole ribbon form dripped down from the top to the bottom creating some sort of wavy curvilinear shape for the staircases. To make better use of the space, the architect extended some rods from the top of the ribbon strips to create a little platform for the display. I also noticed that there were several shelves hanging high up on the wall and I wondered how the displays could be changed. Later, I learned from a salesperson that they simply used a long ladder.

From my observation and understanding, the architect usually adopts the design concept in designing regular stairs with continuity of the stairs rhythm together with the curve on both sides to create the sculpture ribbon form. The distorted glass railing panels created an extra illusion for the ribbon form staircase. The ribbons sculpture landscape form, which is made of 55-ton steel and leather brown rubber, attracted people from the street to venture inside the store. This elegant structural form has become the signature of this high luxury store. I was curious about the structure and the construction process of the staircase. Therefore, I conducted a further study on the structure regarding its support and its fabrication. The staircase includes twenty-three steel plates 11-inches wide and 1.25-inches thick covered with rubber. The measurement of the stairs is 60ft. by 46 ft. by 17ft. A panel of steel ribbons also extends up along the back wall. There is another visual link between the two levels, emphasizing the store's verticality and upward visual motion. The vertical plates start from the staircases and vary in depth and curve to match the form of waves of the ribbons. From the floor level, the stair switches back on itself with two intermediate level landings before reaching the second floor, forming a "Z" shape in plan.

In studying the structural system and the comfortable level of vibration, I got better ideas and gained wider knowledge of the staircase design. Frankly, I did not realize that there could be so many considerations for the staircase design. "Structural parameters which control vibration are mass and stiffness…. The thickness of steel has been investigated to optimize the ethereal appearance of the structure to meet with the necessary strength, deflection, and vibration requirements." Therefore, the staircase design has to meet

with the comfortable level of vibration, and economic factors in respect to both material cost and time optimization in construction. (Figure 56) In actuality, this staircase was built off site and cut into transportable sections and then welded together on site.

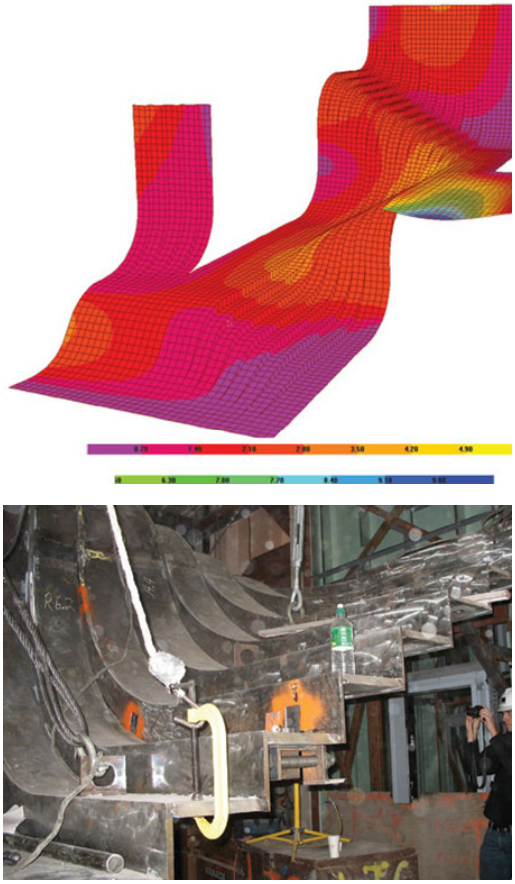


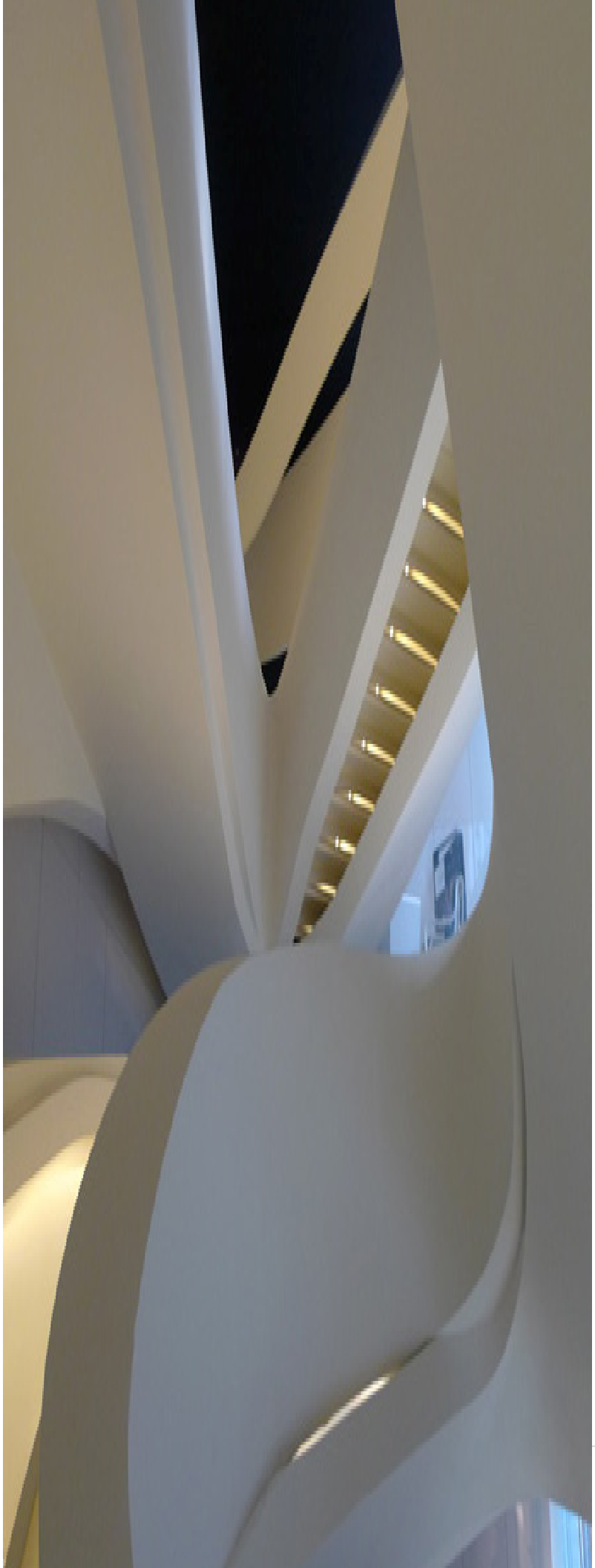
Figure 56 Construction

This particular design is combined heavily of architectural and structural engineering designs. Therefore, it is important to study both sides, instead of solely on the design form. The building is unique with its structure of a high ceiling and the stair's special structural details highlighting the entire store. This is definitely a one-of-a-kind store which is well designed throughout and customized from bottom up. The second floor is the main retail area and it has a laminated timber ceiling. The timber ceiling has different shapes within it – some parts are sliced open and some are folded downward to create display shelves. The vertical design elements are commonly used throughout the whole store. I like the design as it actually integrates with the merchandise. It is a good idea to use the laminated wood and the layered design to create the showcase shelves. By using different lengths of laminated timber bent dynamically throughout the store, the overall design fits together well; and the detailing is created fanatically. The little strip of lights under the shelves are perfectly highlighted each display. In my view, the only defect of the store is that it should not display so many of the same type of merchandise because it creates a messy look for the whole design.

This is one shop that has dynamic design and that can integrate well into the design concept and with the merchandises. The ribbon concept applied continuously

throughout the store with a slight twisting in the design creates an entirely different showcase area for the floor. The design has produced an interesting spatial experience and the visual effect for the shoppers. (Figure 57) Compared to other boutique stores, it is not easy to attract shoppers to the upper floor especially in some high-end stores. This might be due to the atmosphere, price, and merchandise that have experienced a decline in interest by the shoppers. Personally, I did not feel the merchandise or the display of Longchamp would attract me to go inside the store; however, with the intriguing design of the store, I was willing to check out the store when I first learned about this brand because of its architecture. In reality, this could be one of technique for brand promotion: by spending more money on the renovation of the store to achieve the effective advertising. Many design stores may focus on one design element and overlook the whole picture. However, this is a typically successful design in which the store achieves what it intended to be by means of a special architectural design that attracts shoppers to visit different levels of the store.

Figure 57 Second Floor



6.6 Case Study 6 - Giorgio Armani

Visited:	December 15, 2009
Location:	717 5th Ave., Manhattan, New York, NY10019
Function:	Boutique
Completion:	December 2001
Architect:	Doriana & Massimiliano Fuksas
Client:	Gruppo Giorgio Armani
Program:	2,800 square meter

Concept

Doriana and Massimiliano Fuksas expressed, "The building that incorporates Armani/5th Avenue holds a very important place in the history of architecture because its façade is one of the first examples of the "International Style". When one is dealing with such a cultural milestone, one must always bear in mind that the exterior is totally New York, while the interior should have its own identity. A reflection of the flair and aesthetic values define the Giorgio Armani style. The grand staircase is the focal point, an exciting sculptural feature, which connects all different levels that accommodate the Armani universe range by range. Innovative in both layout and content, Armani/5th Avenue is the first concept store in which all the Armani products are presented in a single space, where the same design has been adopted throughout: the subtle colors and restrained shapes emphasize the value of the product."

Description

The store is neatly defined and is lightly clad in glass with 164 feet long and 45 feet high. The LED thread on the façade created a sprinkling simulation of movement representing the festinating New York City. (Figure 59) This building has become an icon of the area. The store has four floors and a basement with total area of 43,000 square feet. The retail area occupied approximately 30,000 square feet while the bar and restaurant took around 5,200 square feet.

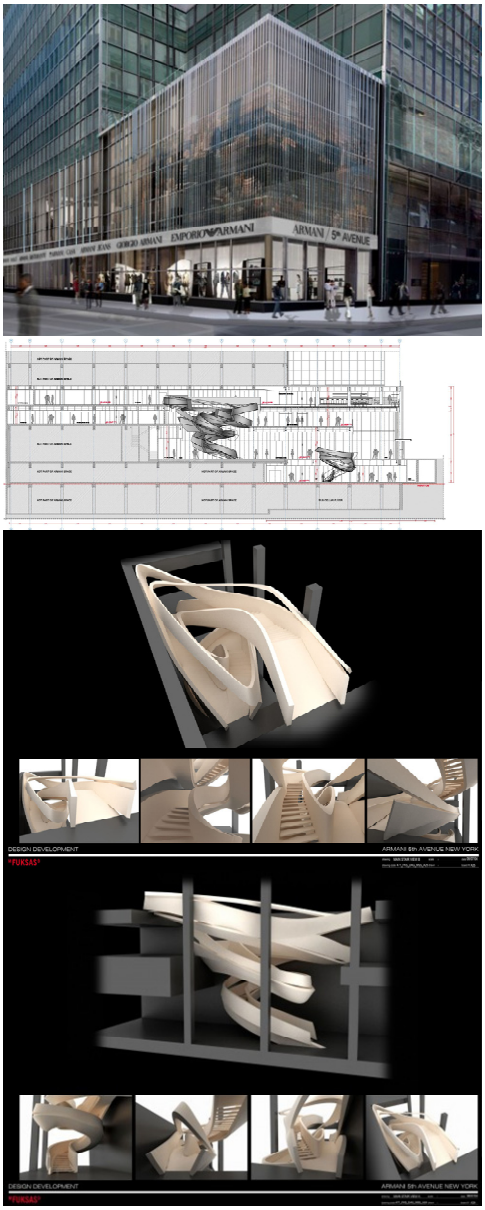


Figure 59 Sculptural Staircase

Entering the store, there is a large screen featuring the fashion show video for the season. There is also a small sculpture staircases leading to the basement. The architect is so bright to put up an innovative design and space layout in the store with different experience for shoppers. As shoppers come in the store, they will immediately get into a mood of adventure. The 4 main showrooms are connected with a powerful sculptural staircase that has no boundary. It is in a structure shaped with the radiator grill of steel, which is clad in plastic material. The entire store is designed in black from the ceiling down to the floor using glossy finishes to provide a strong contrast with the staircase. The central piece is in creamy white with lighting from the top. The curve movement form continues to be the feature throughout the entire interior design with both display units and hanging units and even for the desks and chairs. This elegant design has made the art piece become a signature in the store.

The design is so elegant, fresh and modern which is just fit for the store and the brand.

Inside the store, it has many intimate spaces at each section. The shelves are customized to match with the central sculpture piece; yet, it has not devastated the shoppers' attention. There is no element extraneous to the internal dynamism. Thus, the reflection of the black tile floor matches with the sculptural frame for the clothing. The sense of movement at the staircase with the overlapping bands gives a distinguish look of the structure, that leads the shoppers to move upward to different levels. This design has reminded me of the museum in Helsinki, Kiasma Museum of Contemporary Art by Steven Holl. Although the design is not as dynamic as Armani, they are using the same design concept. Both designs focus on the central staircase and intend to lead people to different levels. The waving sculpture form continued to different floors with the changing curved pattern has really created the visual interest to shoppers.

There is a restaurant on one side at the top floor overlooking the entire sculpture form. It has a line of lighting on the wall extended from the ground to the entrance of the restaurant. Inside the restaurant, it is filtered with amber veils and the glass sidewall gives a fabulous view of the 5th avenue and Central Park.

Reflection

Armani is one of the most distinctive stores, which has meaningful exterior design and strong vocabulary interior. At its location, the store is allowed to have its own façade and characteristic, unlike the boutiques in other districts that have strict restriction to keep the existing historical facade. Due to this reason, the store is able to combine historical and modern elements together to recreate a timeless elegant design. Although it has a powerful sculpture element, it does not give people an overwhelming feeling. In fact, it provides a comfortable shopping space for shoppers. The color scheme for the store is completely black with lighting from top in the center piece of the staircase. As people stepped in this masterpiece, their eyes will be caught by the sculpture of staircase that continues to the next level. The staircase is curved in different ways as shoppers go along, providing different feeling at different levels with the experience of changing in spaces, time, and emotion. This design is perfectly fit with the concept and the program for the store with all combination of Armani products. Compared to Prada, Longchamp, and other boutique stores with similar design concept by using art piece to draw shoppers going to different floor levels, Armani has a better design approach in respect of space using, circulation movement, space transforming, and connectivity. After all, Armani provides a completely unique shopping experience to shoppers with the combination of fashion and architecture as a whole.

Figure 60 Staircase

7.0 Folding

8.1 Case Study 1

Issey Miyake

8.2 Case Study 2

Tribeca Issey Miyake Store

8.3 Case Study 3

Peter Eisenman

8.4 Case Study 4

Alessi Flagship Store

7.1 Case Study 1 - Issey Miyake

Issey Miyake is one of the Japanese fashion designers to have awarded major status in the international fashion field. In 1970, Japan was having cultural and economic changes. Miyake started researching in Japanese culture, traditional textiles and clothing techniques, like kimono- wrapping and layering. He created '*A piece of cloth*' that was made from a single piece of cloth with no visible seams or fastenings. Conversely to the western, clothes are cut to the shape of the body and sewn together. It is more emphasizing on body shape rather than the space between the body and the garment. In kimono tradition, the dimensions of the garment are unchanging, the cloth wraps the body and the surplus is left hanging. Moreover, Japanese fashion became identical during 1980s with Miyake "one-size fits- all" outfit. Miyake said: "I am interested in the space between the body and the clothes so that the body can feel entirely at ease. Because each person's body shape is different, this space creates an individual form. It also gives the wearer freedom of movement for body and spirit."[33]

33 Lecture at the Los Angeles County Museum, May 1987. Cited in Jun I Kanai, 'Fuku (clothing) which brings fuku (happiness)' Issey Miyake: Ten Sen Men, Hiroshima City Museum of Contemporary Art, Tokyo, 1990, p 75.

Pleated is another invention on clothing and is made of fabric with folds. Pleats move and change forms with the body movements. Miyake also plays with optical illusion effect to have the colors change with the motion of garment, like a kaleidoscope. He believed pleats contain endless fascination for him, and inspire a multitude of images.[34]

Issey Miyake developed the 'Pleats Please' clothing line in 1988. Pleated silk dresses go from the shoulders and hang softly to the body that enhances the female figure. Miyake has reversed the method of pleating fabric that he cuts and assembles a garment two and a half to eight times its proper size.[35] The fabric, lightweight stretch polyester, is then folded, ironed and over sewn so that the straight lines remain in place. The garment then places in a press from where it emerges with permanent pleats. [36]

34 Miyake, Issei. Issei Miyake: ten sen men.. Hiroshima: Hiroshima City Museum of Contemporary Art, 1990. Print..

35 Mitchell, Louise. The cutting edge: fashion from Japan ; [published in conjunction with the Exhibition The Cutting Edge: Fashion from Japan developed by the Powerhouse Museum, Sydney in association with the Kyoto Costume Institute, 27 September 2005 - 29 January 2006]. Sydney: Powerhouse Publ., 2006. Print

36 Miyake, Issei, Kazuko Sato, Raymond Meier, and Hervé Chandès. Issey Miyake making things . Paris: Fondation Cartier pour l'art contemporain ;, 1998. Print.

'Minaret dress' is one of the dramatic pleating garments for spring/summer 1995 collection. Like a traditional folding paper lantern, the dress folds down into a flat circular form with bold vertical stripes colors (Figure 63). The dress is given its bold silhouette by a series of nylon hoops that begin at waist height and increase in size to the ankle.[37] From two dimensions folded flat surface transforming to three dimension outfits with movement, this dramatic transformation is not only easy to store, but also lightweight, washable and fast drying. It servers every single aspect the modern world needs, from dimension to fabric caring, and it is really convenient for people. (Figure 62)

Issey Miyake is a master for recreating sophisticated garment by learning from the traditional and simple ordinary substance. He emphasizes the importance of spaces between the garment and the human body.

HFigure 61

architecture spatial as well as a shell to house the human body. This spatial gap can be applied in bigger scale and creates an interesting interaction not only between fabric and human body, but also with the nature.

Figure 63 Folded Stage

Figure 62 Minaret Dress

37 Mitchell, Louise. The cutting edge: fashion from Japan ; [published in conjunction with the Exhibition The Cutting Edge: Fashion from Japan developed by the Powerhouse Museum, Sydney in association with the Kyoto Costume Institute, 27 September 2005 - 29 January 2006]. Sydney: Powerhouse Publ., 2006. Print

'A-POC'

I have endeavored to experiment to make fundamental changes to the system of making clothes. Think: a thread goes into a machine that in turn, generates complete clothing using the latest computer technology and eliminates the usual needs for cutting and sewing the fabric.[38]

A-POC line of clothing is intended to create wearable and practical clothing from one piece of fabric without waste, cutting, and seaming.[39] It is a long tub knitted fabric that is manufactured and precut into wardrobe of garment without any sewing. Miyake used the oldest knitting technique to develop a new trend of high-level stretch yarn to create a subdivided tube of cloth cutting with scissors and opening to form garments. A-POC was first appeared in 1997.

A-POC is one of the "Green Designs" without any waste of fabric. (Figure 64) It is similar to the tailoring garments but is precut on one whole piece, which is worn to fit with the body shape. Because of the material used, it can be stretched to fit with the body. This design method can parallel with the tension structure that is required with the frame and a one big tension fabric wrapping on top of it. Sharing with the similar idea on this point, the architect need only to design the structure frame instead of designing the fabric for fitting into the structure. This fabric structure can fit and use for all sizes of buildings. These innovative designs and ideas are both made reference to the traditional use of kitting and tent idea, and now being modified for

Figure 64 A-POC

38 "'a-poc making'. issey miyake and dai fujiwara." designboom. N.p., n.d. Web. 10 Dec. 2009. <http://www.designboom.com/ eng/funclub/apoc.html>

39 Mitchell, Louise. The cutting edge: fashion from Japan ; [published in conjunction with the Exhibition The Cutting Edge: Fashion from Japan developed by the Powerhouse Museum, Sydney in association with the Kyoto Costume Institute, 27 September 2005 - 29 January 2006]. Sydney: Powerhouse Publ., 2006. Print.

7.2 Case Study 2 - Tribeca Issey Miyake Store

Visited:	September 29, 2009 November 25, 2009
Location:	Hudson Street 119, NY 10013 New York
Function:	Retail, shop, showroom
Completion:	2001
Architect:	Gehry Partners
Client:	Issey Miyake
Program:	Transform the space by using unusual materials to create movement, light and energy in the lofty of 150,000 sq foot space.

Issey Miyake design philosophy: Tradition and technology, new shapes and forms - a garment with respect to a past and future

"Shop Until You're Blown Away'' is the message of the Issey Miyake flagship store in Tribeca, New York. I visited this store twice and had a completely different impression each time as a result of the change in temporary decorations. Both the permanent and temporary interior decorations had been perfectly tied with the displayed garments. The store was designed by Frank O. Gehry, who is known as a sculpture form designer; his design style is usually represented by whipping through space, transforming everything in its path with innovative material used, which can perfectly coalesce with the fashion design style of Miyake.

During my first visit to the store, I did not conduct any research beforehand wanting to get a true first impression of the store. When I arrived at the area, it was hard to find the store. There is nothing special about the façade or entrance to the store; it only appeared to be a classical New York building. The entrance showed the latest series of fashion design - A-POC. The temporary decoration with a big piece of fabric showcase displayed the theme for the seasonal design. "A-POC - A Piece Of Cloth is a totally new concept for making clothes and sees Issey Miyake return to one of his original concepts: creating clothing from a single piece of cloth. Through unique technology, a computer controlled loom creates three-dimensional garments in a single process… A-POC suggests unlimited possibilities…". There were four main designed clothing lines of Miyake's displayed in the store; namely, Pleats Please, Me, HAAT, and A-POC. For each different clothing line, Miyake uses different fabrics and design techniques to create the garment. Nevertheless, all the designer clothes still reflect his personal design style with new shapes and fabrics. Unlike some other fashion designers, Miyake's designs normally varied from each fashion trend. Due to this reason, his fashion designs could hardly create a personal style. Gehry said: "I think Issey and I maybe are after the same thing in our work. We're both trying to express movement and play around with new materials that haven't been used before." Perhaps, this is the reason for the perfect match between the architecture piece and the fashion piece in the store.

The store consists of three floors located at a restored 1888-warehouse, where the façade remained the same as it was. The retail area is on the ground floor with 30,000 square feet displaying a mixed series of clothing lines with collections for women and men. Miyake designed a lot of bottle holders on A-POC fabric for displacement; while, the salesman demonstrated the different ways to carry them. It is also used as a window advertisement for hanging up in the store. Apart from the temporary displacement, there were the titanium metal sheets for wrapping around the ceiling from the entrance to the end of the store, even extending to the basement level. The form of titanium metal sheets look like a role of freeform fabric spreading out to integrate with the garments, although the form of the titanium decoration is a bit overwhelming in the space and the use of color in the store just plain to enhance the displayed garments. Personally, I like the materials chosen by Gehry, that he used thin strips of wood on the ceiling to soften the hardness and cool feeling of the titanium sculpture piece. (Figure 65) Besides, the glass flooring provides a transparent view of the office space down below. As I entered the store, the architecture began to attract me and guided me to walk through the whole

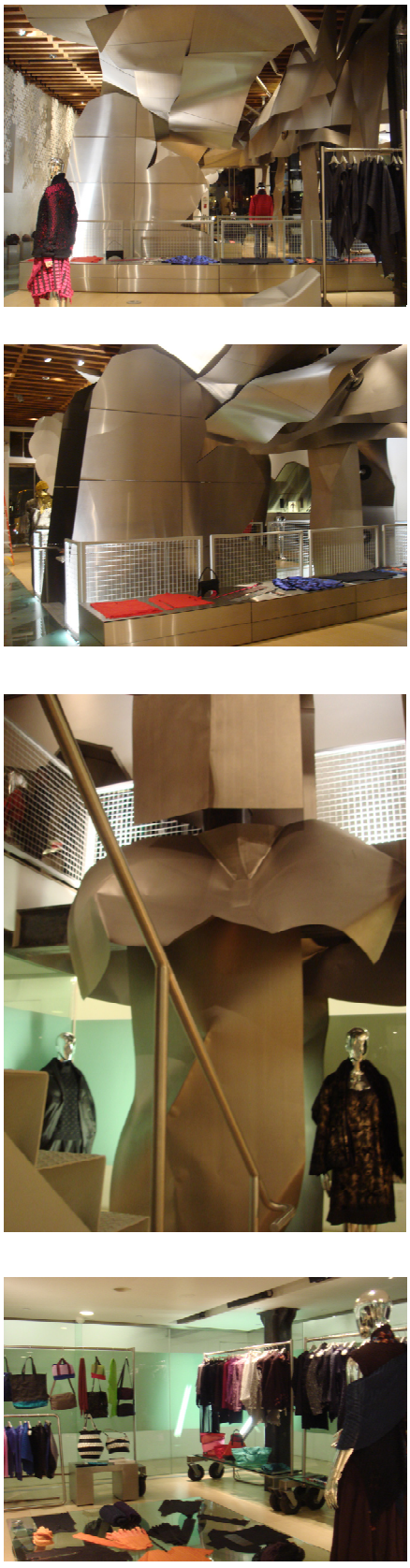


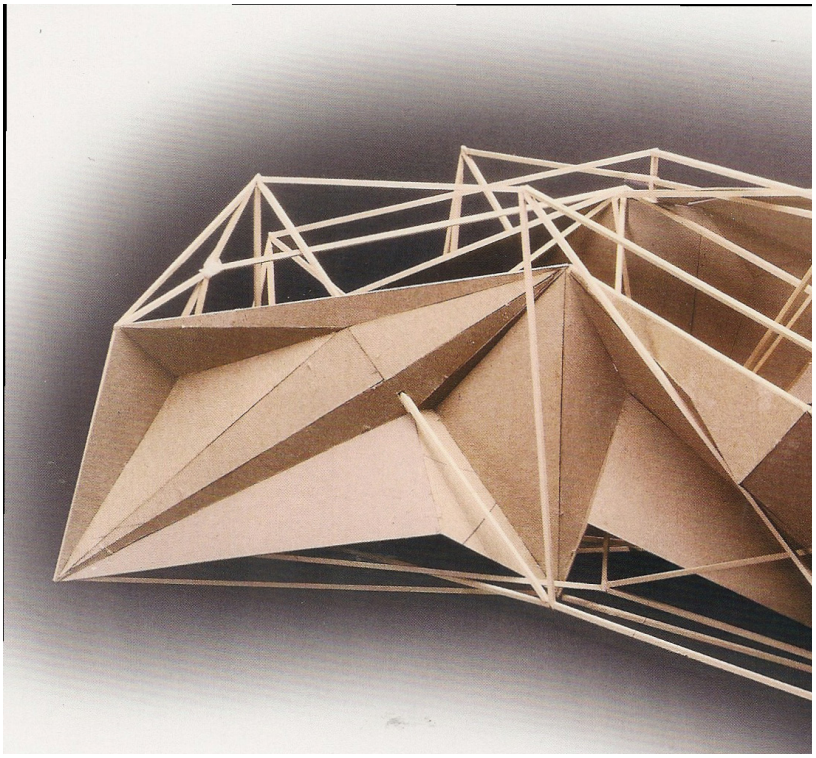
Figure 65 Basement

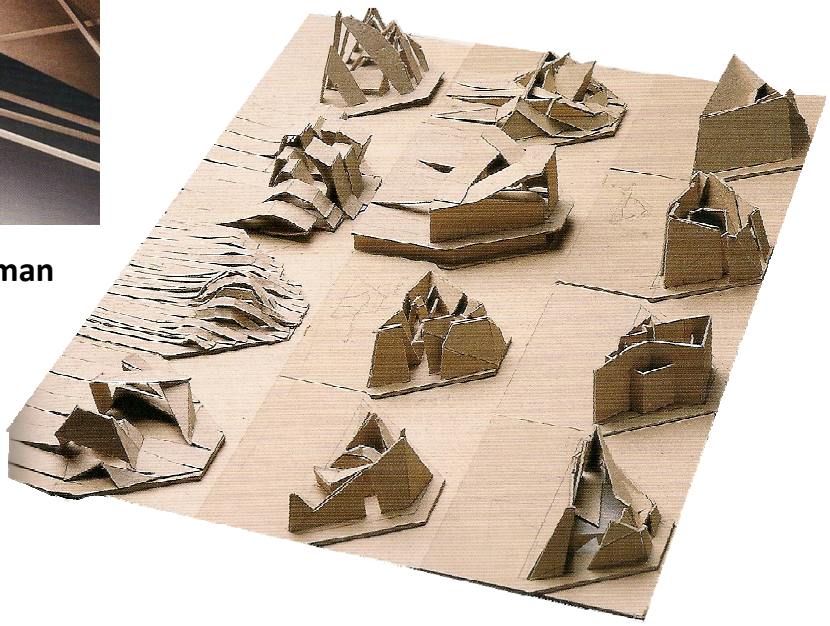
ground floor in the store. With the powerful titanium sculpture, it brought to the shoppers' attention the displayed items along the way to the lower level. Gehry named this design "The Tornado" which extends the designed titanium form straight down 25 feet high from the ground floor ceiling to the basement floor and ending up right in front of the staircases.

The space in the basement is divided into public and private separated with glass walls. The basement appears to be different from the ground floor in that there is not much decoration design or any special space designed. It seems to have lost the design connection between the ground floor and the basement. The interesting thing to note is that the clear glass opening from the ground floor is actually a path, a corridor, to the private office space leading to the basement. In this regard, the garment does not seem to have any interaction with the design nor the displacement.

In my second visit two months later, I found that the window display, the temporary decoration, and the clothing had been totally refreshed. With the winter theme, the designer had created a set of modular patterns hanging down from the ceiling mimicking snowflakes. Thus, the dripping repetitive pattern sat right at the entrance to get the same harmonious feeling with the inner hanging pattern. The store also added a lot of artwork to raise the interest of shoppers.

There is no doubt that the store design on its own reflects Miyake's design style, but for the display of garments, it has not been well connected. The display racks and stands do not match with the curvilinear design on the ceiling. Conversely, the store is frequently changing the display in the window and the interior temporary design according to different themes and seasons. A number of designers and artists have been involved and have participated to create the design and to use some innovative materials for the display. This can provoke the interest of shoppers to revisit the shop more frequently. Besides, it also brought along a message to remind the shoppers of the new arrival items, and to create a refreshed feeling to shoppers while they shop in the boutique.





7.3 Case Study 3 - Peter Eisenman

Peter Eisenman is one of the founders of the theory in postmodern and deconstruction practicing architect. He was born in 1939 in Newark, New Jersey. He received his firs bachelor degree in architecture from Cornell University in 1955, then, the master degree of architecture from Columbia University, M.A., and the PHD. degree from the University of Cambridge. He also gained an honorary doctor degree from the University of Illinois Chicago. His projects are comprised of a large-scale housing and urban design schemes, innovative facilities for educational institutions, and a series of inventive private houses. He received a national honor award in 1993 and has been honored by German government to feature the project on a postage stamp commemorating the 750th anniversary of the city of Berlin. Many Eisenman's works are regarded as the fold architecture that involved folding, rotating, and overlapping. He expended the folding idea to different scale of design, from architectural form to topography, and the large urban forms.

Church of the Year 2000 is a typical example of Eisenman demonstrating the manipulation of the folding technique to create the forms and spaces for the building. The design with this folding technique showed the connection between human being, the nature, and the god. The study model has clearly showed how Eisenman started his work from flat surfaces and transformed into three-dimensional strips to form an actual spatial quality. In Eisenman's design, a pilgrimage church should have different spatial for the congregation. "The church itself must provide the pilgrim's experience of distance with its two side aisles, or two routs, providing passage as in a pilgrimage space of communion." [40] The passages are enclosed to highlight the contrasts of light and shadow, space and mass to express of the sacredness. A contemporary form of stained glasses was used to replace the old gothic cathedrals that formed one of the major elements in the church. The church was symbolized with its two routes, proximity and distance. In this fold architecture example, its continuity in folding with the linkage of two paths has created a dynamic effect to the building form. (Figure 66)

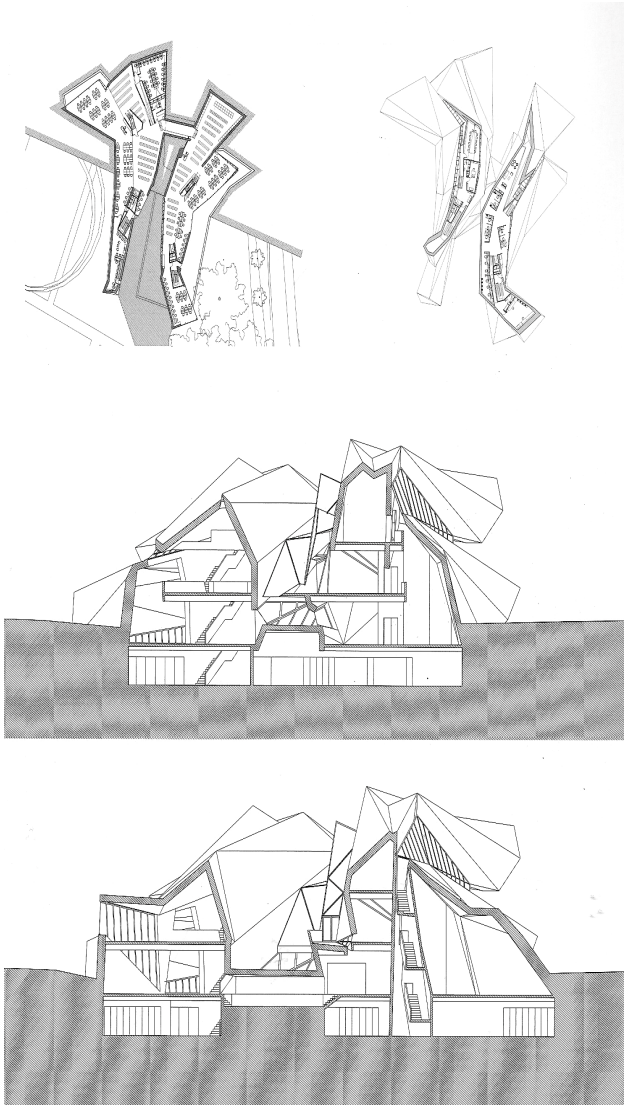
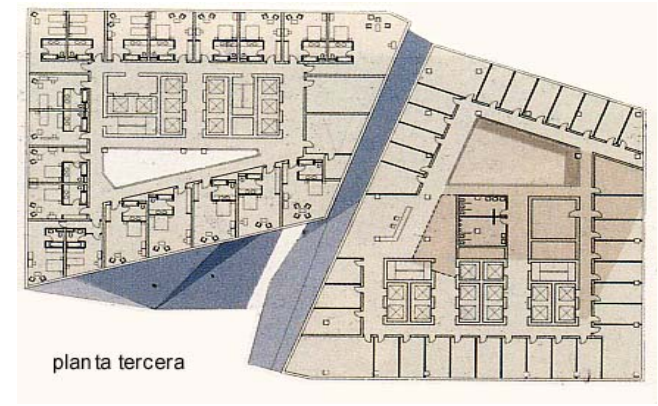


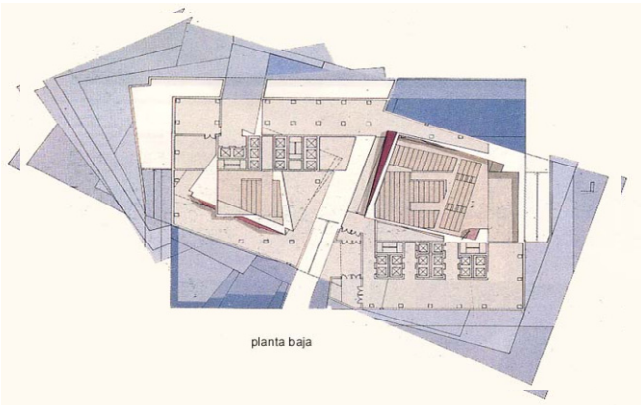
Figure 66 Sections

40 Davidson, Cynthia C., and Stan Allen. Tracing Eisenman: Peter Eisenman complete works. New York: Rizzoli, 2006. Print.

Figure 67 Building with Folding Technique

After the downfall of the Berlin Wall, Eisenman proposed to build a tall project of 420 feet for memorial. The site was formerly belonged to Max Reinhardt a prominent theater producer in Germany in the early twentieth century. To celebrate the energy and vision that Reinhardt produced, Eisenman designed a dynamic form to reflect the changing character of the city. A thirty-four stories building was vertically folded on its central part creating a structure that has been separated, twisted, rotated and rejoined on the rooftop. (Figure 67) This multifunction building of one million square feet consisted of variety of offices, hotel accommodation, film, and media auditoriums, retail shops, a fitness center, a restaurant and a press room equipped with video and audio technology.





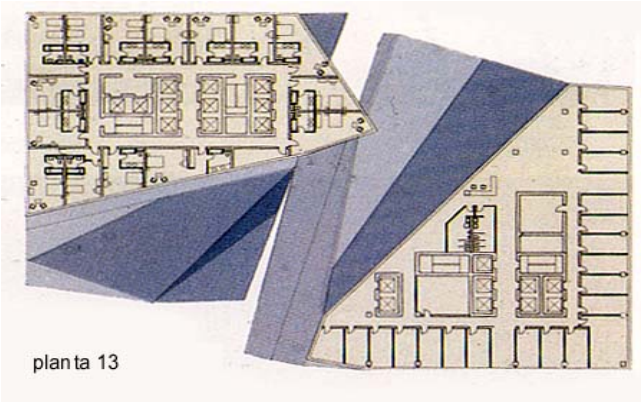


Figure 68

Applying the rotating, twisting and folding idea, the building has shaped its particular form. (Figure 68) This was completed through a few stages. The first stage was to extend the sectors and the form to allow a trussed structure to have vertical and lateral support. The second stage was to invert the form to hold together. At the third stage, the folding provided a large public space for the memorial of the Berlin's history. In this folding idea example, it has focused on the expressed complex network of the urban context with folding and rotating technique to organize the form. (Figure 69)

In conclusion, Eisenman's folding technique has created a dynamic form that does not have a scaling limit. It can be of a small architectural building as well as a large urban scale. The folding technique can be used to create a different spatial experience for the users. It is so flexible and does not confine to any rules in the design field.

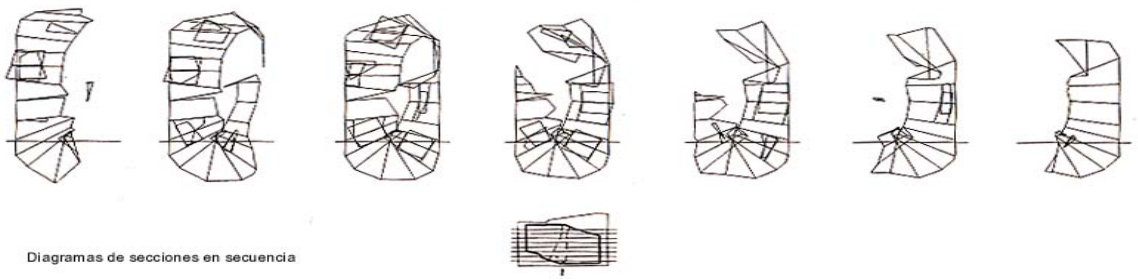
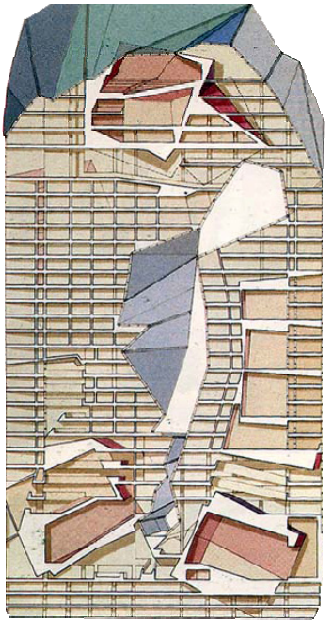
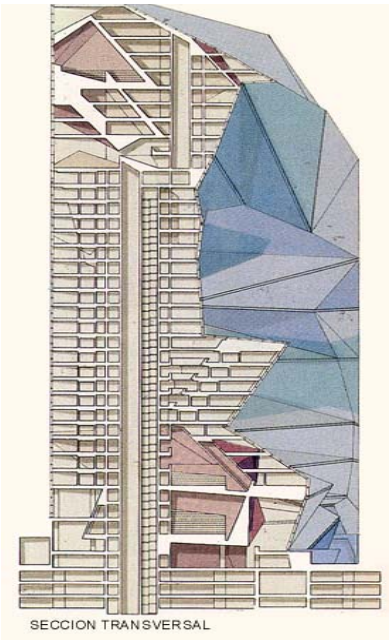


Figure 69





7.4 Case Study 4 - Alessi Flagship Store

Visited: December 06, 2009

Location: 130 Greene St., New York, NY10012

Function: Kitchen Hardware

Completion: August 2006

Architect: Asymptote Architecture- Hani Rashid (Egyptian architect)

Client: Alessi US Shop

Program: 2,750 square feet

Cost: $1.4 million

Background:

A family-owned company since 1921 has been turning into an artful version of kitchen accessories with a coffee bar inside. “Rather than impose our corporate image, we wanted to adjust our American flagship to the locality…In New York you can’t do the same thing you do everywhere else. We wanted something different, something quirky.”, as explained by Alessi executive vice president, Jan Vingerhoets

The store is located in a present New York City streetscape, with a narrow front opening of 13-foot-wide. Thus, this loft has a long space, which is hard to bring shoppers to the end of the store. (Figure 70) As a result, the coffee bar is planned inside the store near the entrance to welcome shoppers and let them gradually move through to the interior retail area. Hence, it becomes the main challenge in combining the two different programs together.

The folded ceiling and walls are made of medium-density fiberboard and spaced algorithmically. The architect has created the consecutive layers of angular arches to structure the entire store design. Moreover, there are nine bands of white light running vertically up and continuing horizontally across the ceiling together with the mirrored wall at the end to create an infinity illusion for the space. “The action of these surfaces combined with the repetition of bar lights draws the eyes to the back of the space and creates a continuous reading,” Asymptote project architect, David Lessard. The jagged receding planes visible from the street, are dramatized by 2-foot-wide light bars that edge the folds.

Figure 70 Bar area

Through studying the lighting design on this building, I learnt that the lighting could be individually dimmed to distinguish the functions of each space. As the dimming system is much expensive, the architect decided to use T5 fluorescent fixtures as replacement with the arrangement of three lights per vertical and horizontal walls. The lighting system is designed to have individual switch with three, two or one light on depending on the needs. To highlight the store products, the architect worked with the furniture manufacturer to design the shelves with the built-in lighting. On the shelves, there is 2W white LED lighting. The 6300K-color temperature of the light from the LED appears to be the perfect matches with the stainless steel kitchen wares.

Lighting and architecture combined as a whole created a wonderful harmony. (Figure 71) Alessi Flagship store has used the similar design concept as Hugo Boss, which is due to the architecture element need for enhancing the design by the lighting system that highlights the character of the design.

Figure 71 interior

8.0 Transformation

9.1.1 Case Study 1

Hussein Chalayan

9.1.2 Case Study 2

Curtain Wall House

9.1.3 Case Study 3

Gary Chang

8.1 Case Study 1- Hussein Chalayan

Hussein Chalayan is one of the world's most important experimental designers and has twice been named British Designer of the Year. He was born in Nicosia, Cyprus, educated in Cyprus and later in London. His bio-cultural background enables him to see things with different perceptions. His work is theoretical in term of transformation, perception, and rituals of space. Chalayan's work represents a congruity of ideas that indicate fashion and architecture are coming closer together. His strategy is to integrate clothing with its surroundings, not merely by making dresses look architectural, but by rendering a comprehensive understanding of different environments and the diverse factors that create them.[41]

Chalayan has gained experience and worked in different fields with different people, like architects, artists, textile designers, and engineers. By combining different perspectives of techniques, his design work which comes out from each season's collection usually brings along strong even tremendous shock within the design industry; for example, transforming an envelope into a garment and a coffee table into a wearable skirt, making automatically transformable garments from obsolete to modern, making good use of high technology with lasers, LED lights, and crystals to create garments in different forms and ways. His innovative ideas have brought a completely different perspective to our world, possibly even shaping our future.

41 Quinn, Bradley. Techno fashion . Oxford: Berg, 2002. Print.

Airmail Dress (December 1999)

Chalayan's first transformable garments were his "Paper Dresses"(December 1999), made out of Tyvek, a synthetic paper whose creased, uneven surface create unusual patterns of shadow and light. The dresses can also function as letters that can be written on, folded into envelopes and sent in the post or made into kites. The dresses are spare, clean and constructed to create volume without adding layers underneath. The most famous of these is the paper dress worn by Bjork on the cover of her Album Post. The Paper dresses are durable enough to be refolded and posted many times, and the kite dresses can also easily be transformed back into their dress versions again.

Before Minus Now' (Sp/Su 2000)

In Chalayan's '*before minus now*' collection (spring/summer 2000), this principle was inverted to produce furniture that can be transformed into garments, demonstrating the reconstruction aesthetic. This collection was intended to express displacement and expatriation, but the objects made for the collection also deserved recognition for their design genius. The collection featured five pieces of domestic furniture designed to be transformed into dresses and skirts, which can then be packed into suitcases. Chalayan's chair functioned as both furniture and wearable dresses, and can be folded into suitcases by collapsing their frames. The round table can be transformed into an accordion-like skirt by removing a rounded disc from the table's centre and pulling the inside edge up over the hips and attaching it to the waist.

One Hundred and Eleven (Spring/Summer 2007)

This collection explored how fashion has been shaped by the events of the last hundred and eleven years, including wars, revolutions, and political and social changes. These events and changes were reflected in the clothing shown in historical chronological order. They were finally shown by a series of mechanical dresses, parts of which can be moved, abstractly morphed from one era's style to another.

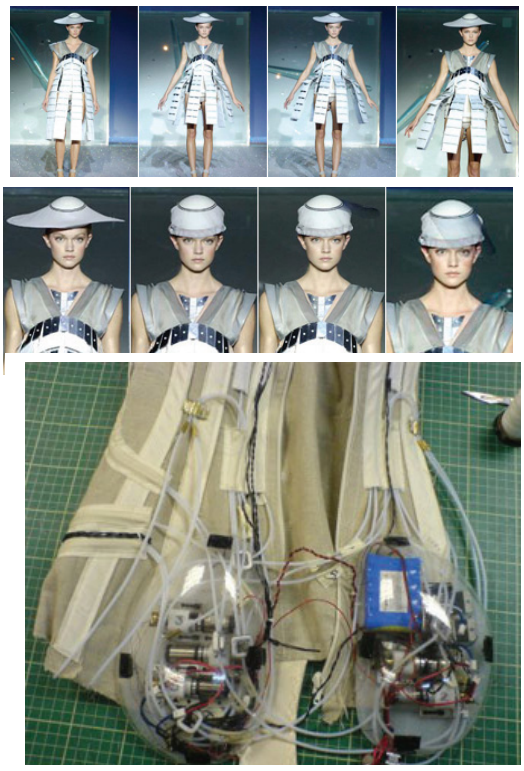
Chalayan designed five mechanical dresses that can be automatically transformed in shape and style without requiring additional manual effort, as the clothing is designed to be computerized with motors and wires made by a 2D3D engineering and concept-creation firm.[42] These series of the clothing are changing into various shapes to represent the events that occurred within each of the three decades. For the1906 costume, it represents the decades of 1906, 1916 and 1926. The next series of dresses are for the decades of 1926 to 1946 and so on. While the final series of dresses represent the most recent decades of 1986, 1996, and 2007 and have ended up with a beaded flapper dress of the twenties.

42 Ross, Rachel. "Transforming Clothes - Technology Review." Technology Review: The Authority on the Future of Technology. N.p., n.d. Web. 28 Apr. 2009. <http://www.technologyreview.com/read_article.aspx?id=17639&ch=infotech>.

One of the Chalayan dresses is featured with a rising hemline and a bustling of the skirt at the back. The dresses are operated electronically with controlled, geared motors. On the buttocks, there are some hard containers that hold battery packs, controlling chips including the micro-controllers and micro-switches and little geared motors. The motors are tiny, about a third of the size of a pencil and nine millimeters in diameter. Each of the motors has a little pulley attaching to this monofilament wire, which is then fed through hollow tubes sewn into the corset of the dress. Some of the corsets are very complicated with 30 or 40 little tubes running everywhere and linking the cables to performing various jobs like lifting things up or releasing little linked metallic plates. In addition, there is a huge amount of stuff going on underneath the clothes.

The zipper on the front of the bodice can be zipped up automatically with a magnet on a string. The monofilament is sewn delicately into the hem of the fabric and then crossed over her shoulder and down the model's back.

A skirt made of plastic cards can be automatically raised up from the body, shrunk, and then changed from white to silver. It was all pre-controlled on a microcontroller, according to a predetermined time sequence. The time sequence is set right before the model stepped onto the stage, and switched with an on-and-off button while she walked through the stage. The panels can be released and pulled down with the cables.In an interview with Rob Edkins, the director of 2D3D engineering and concept creation firm, he said that the transformable dresses are not for sale but for display in a museum. He also commented that these transformable dresses would possibly be used in future.



Airborne (Autumn/Winter 2007)

Human culture has derived a universal view that death is regarded as an opposite force to life. Taking the world climates as a metaphor, this collection reflects upon our sense of empowerment and our fears of mortality by linking with weather cycles. The constant renewal and recreation of climate can also demonstrate the constant flux of our human life and death. The project was presented in four seasonal parts - Spring, Summer, Autumn and Winter. In the part of Spring and Summer, each season featured an extraordinary LED dresses consisting of 15,600 LEDS combined with crystal displays.

Readings (Spring/Summer 2008)

Inspired by the culture of sun worship and the cult of celebrity[43], the showpiece of the collection consisted of two dresses, a jacket and a hat, both containing over 200 lasers moving through Swarovski crystals. The lasers are held in place by custom-made hinges and moved by motors, as they hit on the crystals and reflect back from the body creating a matrix of red laser light. The graphical rays represent the aura of performance, with the light space becoming an alternative form—a fine spectacle.

43 "Hussein Chalayan." Design Museum London. N.p., n.d. Web. 17 Feb. 2009. <http://designmuseum.org/exhibitions/2009/hussein-chalayan>.

8.2 Case Study 2 - Curtain Wall House

Completion Date: July 1995

Location: Tokyo, Japan

Shigeru Ban is one of the innovative architects who can use unconventional building materials to achieve a sophisticated building; yet, it still remains economical and efficient. Most of his inspirations are derived from studying the Japanese architectural history and reshaped with a modern approach to meet the need of the present society. In the traditional Japanese houses, there is a strong connection between interior space and exterior landscape. By using a grid and invention of sliding divisions, people can change the space usage according to their needs. He tries to improve people's living by creating new spaces that are functional and, at the same time, can still enjoying the beauty of nature. He viewed "the social responsibility of the architect is tired also the proliferation of global natural and man-made disasters."[44] In his design theory, he emphasizes on "structural lightness and efficiency; spatial and visual transparency;

44 " "Shigeru Ban Talk." Designboom. N.p., n.d. Web. 17 Mar. 2009. <www.designboom.com/history/ban.html >.

the dissolution of the boundaries between interior and exterior space, and economical means of construction." [45] His innovative design and material used have a break-through of the traditional perspective.

Curtain Wall house is a good example to reflect Shigeru Ban's work. The three-story Curtain Wall house was designed for a family in a dense residential neighborhood of Itabashi in Tokyo. The project consisted of the redesign and transform of the traditional Japanese-style residence into a modern style that can satisfy the clients' wish to live in a house which is not only constructed of contemporary materials but also in the sense of openness and freedom in line with modern daily life. Moreover, this building can well demonstrate the way how the building changes it clothes easily. By using the fabric material, it is convenient to change the existing designed pattern, color, or even shape in the way like we change our clothes according to our choice and taste. To comply with the client's favor, Ban designed a dramatic fabric curtain wall hanging over the third floor and drooping to the second floor. By manipulating the traditional house of the shoji, sudare screens and fusuma doors, it has recreated and modified into a thin membrane that can sever the same purpose in respect of privacy and protection. The curtain can be opened or closed according to the user's preference or the climate conditions. During the daytime, the user can pull off the curtain to enjoy the sunlight and the street scene. (Figure 73) At night, when the curtain pulled on, its translucent surface glows up the entire house. For insulation and privacy, Ban also incorporated with sliding glazed glass doors on the east and the south facades. This double curtain wall can also be closed to control temperature, light, and provide privacy. Shigeru Ban's design has break-through the Japanese tradition by opening up the dwelling to the public. People can stand on the deck and watch the street scenery. It seems to bring the traditional Japanese courtyard garden up as an urban landscape view for the user. This cutting edge design breaks the traditional culture perspective and pushes the design further to what could have been done for the building envelop. That is why Ban was proud to say: 'Mies invented the glass curtain wall, but I just used a curtain."

45 "Shigeru Ban Talk." Designboom. N.p., n.d. Web. 17 Mar. 2009. <www.designboom.com/history/ban.html >.

The project is situated on a triangle site, and the layout of the house is similar to an ordinary house except the raised up columns to allow parking on the ground level due to the limited space. In this way, it also facilitates the location of the living room and bedroom on the upper level to have a better view. Having the terrace wrapped around the second level, it allows the user to have extra gathering space and better access to the public. The terrace is contrast to the living room with double ceiling space and opens to the streetscape. With the rectangular design on the functional use area, Ban uses more curve shapes in the service area for contrast effect to allow the users to have different experience.

In my personal view, the façade of the design is so flexible and does not have any boundary that may have a lot of potential to enhance the curtain design to make the façade look more interesting instead of having the curtain simply drooping.

With the curtain design, it allows better wind flow on east and south sides. Thus, the room layout design with the curvilinear wall allows better ventilation inside the rooms. (Figure 74)

Figure 73 Front View

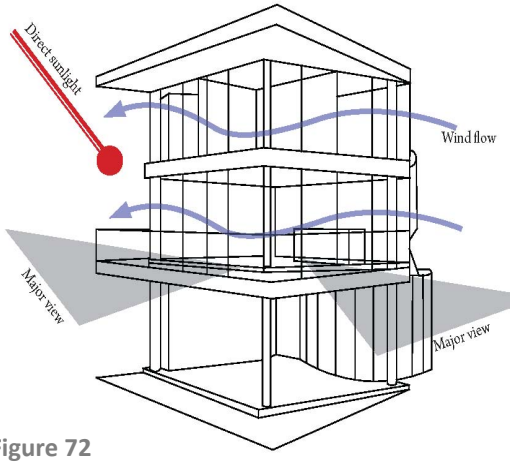


Figure 72

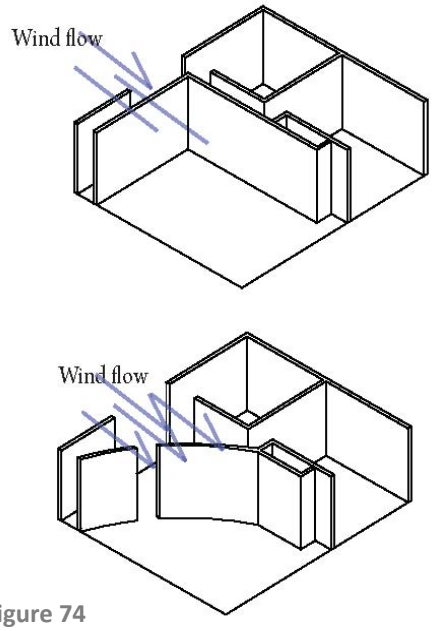


Figure 74

8.3 Case Study 3 - Gary Chang

Gary Chang is a Chinese architect, born in Hong Kong in 1962. He was graduated from the Department of Architecture of University of Hong Kong in 1987 and has founded his own firm EDGE in 1994. Chang was one the first group of representatives from Hong Kong, being invited to participate in the International Biennial Exhibition of Architecture at Venice in 2000 and 2002. He has won many awards for architectural and interior design both locally and internationally. Chang also gives lectures in the universities both local and overseas.

The Suitcase House is one of the experimental development projects dubbed Commune by the Great Wall located in the Nangou valley of Beijing. Twelve Asian architects were invited to participate in the project to design eleven Guesthouse Hotel and a community clubhouse at the foot of the Great Wall. The site of the Suitcase House is located at the entrance of the valley where there is a steeply slope. In order to cope with the site situation, Chang positioned the house in north-south direction to provide maximize views of the Great Wall and solar exposure in matching the continental temperate climate. Chang intended to design a house that is "to rethink the nature of intimacy, privacy, spontaneity and flexibility."[46] A simple box that contains various things and uses, by sliding, folding, rotating and oscillating which could completely transform the house into different look and different uses.

Figure 75 Site View

A rectangular cargo of 44m x 5m size, just like a container, with measurements of 250.5 square meters, formed the house that appeared to have nothing special.

46 Gary Chang "Suitcase House" Chang, Gary, Laurent Gutierrez, and Valérie Portefaix. Suitcase house . Hong Kong: Mccm Creations, 2004. Print.

Despite its appearance, the house is flexible enough to accomplish the user's needs. The house is designed to split into three different levels for fixed use, transformable use, and fully open use. The lower level are fixed for the usage and divided into rooms according to their functions. The upper level are flexible which compiled with fifty hinged floor panels to hide all the ground spaces for dining room, kitchen, bedrooms, bathrooms, study room, lounge, storage areas, and sauna. These floorboards can be opened and closed by pulling a handle-ring to provide variety of living spaces. When the floorboards are pulled up, they serve as room partition and also as sunken space for different function. The design provided the residents with more option to choose the layout of the house according to their needs. The house can accommodate for up to 14 persons overnight, and the guests can have all the facility they need within the house. The house is designed for the user to adapt the configuration according to the number of inhabitants, individual preferences and the nature of activities. Moreover, by pull-down metal ladder, it can connect the upper level living area with the roof space.

Figure 78 Roof

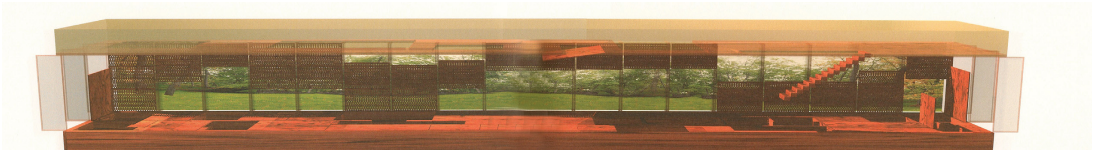
Figure 79 Stair lead to roof area

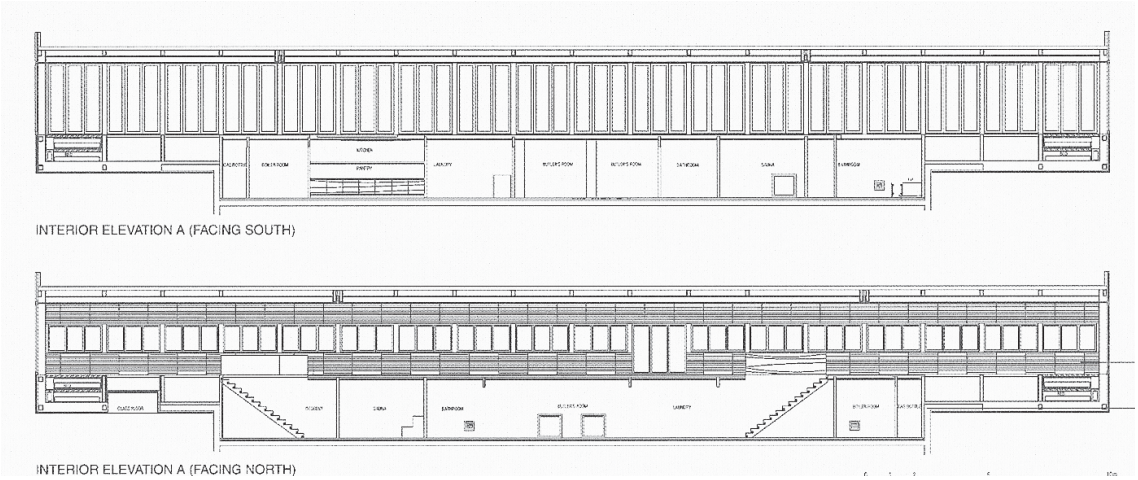
Figure 77 Open Space

Figure 76 Transformation into rooms

In one of the example given in Chang's book, a couple can pull off all the sliding partitions in the daytime to enjoy a totally indoor open space with a dimension of area 44 m. by 5 m. Later in the day, they may open a series of chambers according to their mood, for instance, listening to music in the Music Chamber, reading a book in the library, meditating on the glazed floor. In the evening, the entire space can be turned into a lounge to accommodate more guests for holding a party, a celebration or other events. At night, rooms can then be gradually converted to guest rooms to allow fourteen guests to stay overnight. (Figure 81)

Figure 80 Kitchen





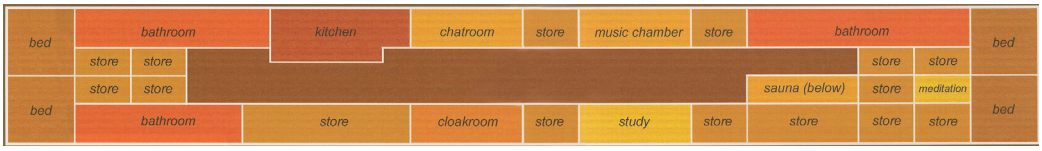


Figure 81 Plan layout

In Chang's design theory, he favors the basic mechanical motions of 'SFRO' denoting the features of sliding, folding, rotating and oscillating, and applies them to a standard mechanical division of spaces and programs. His design ideas are clearly demonstrated in the Suitcase House and his 344 square foot apartment.

Sliding – Moving something from one stage to another in gradation. The sliding motion is one of the features used in Chang's design for the Suitcase House and his apartment that can be literally changed from one condition to another. While function, program and curtain formed the main series of planned movements.

Folding - Opening and closing the hinged articulation. Folding, sometimes, can be found as a part of the floor such as in the Suitcase House, or as a piece of furniture (the sofa/bed) in Gary's Apartment. Folding can be performed depending on the events taken place and can be reversible after finishing.

Figure 82 Folding Doors

Figure 83 Hinge

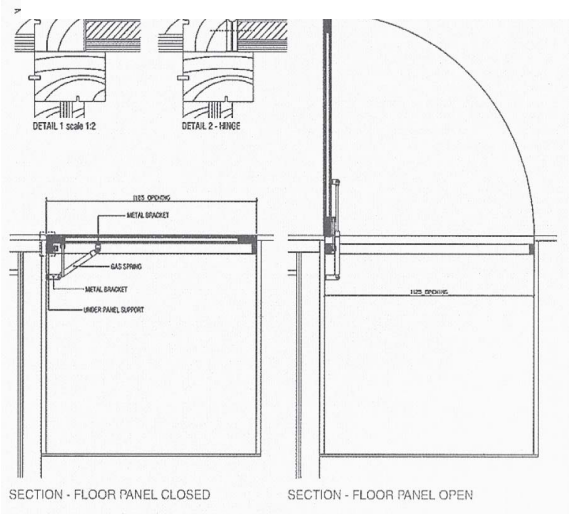
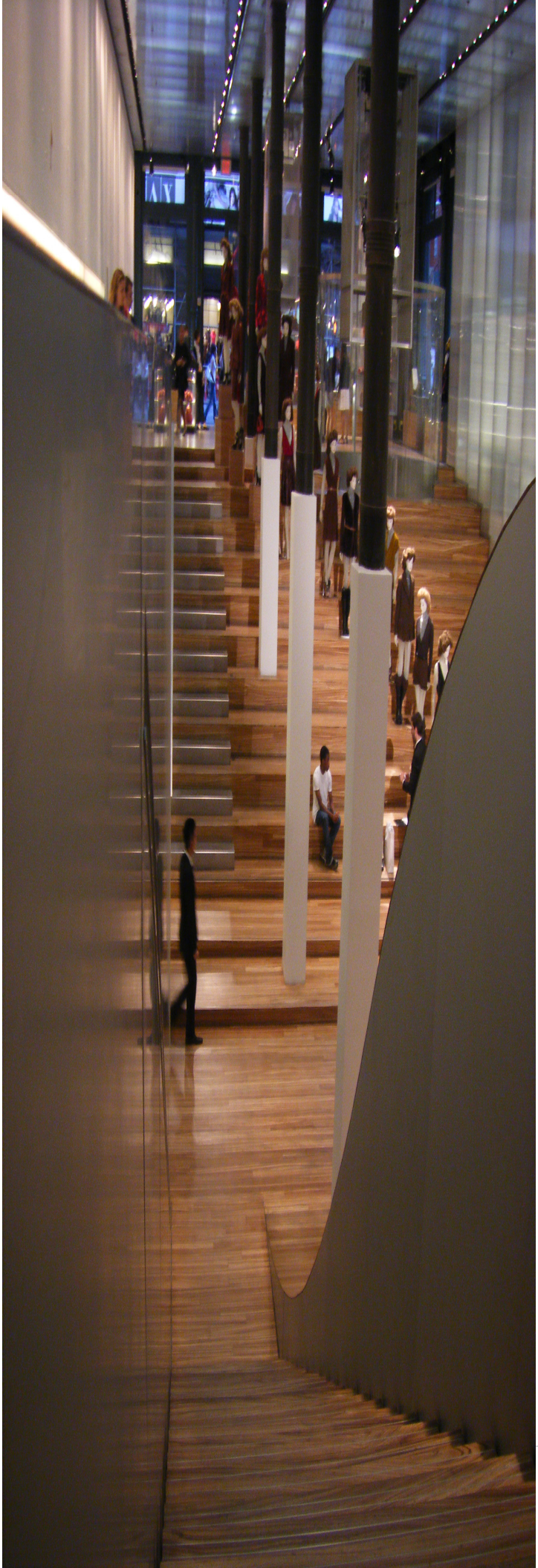


Figure 84 Details



8.4 Case Study 4 - Prada

Visited: December 06, 2009

Location: 575 Broadway, at prince St., New York, NY10065

Function: Retail- Handbags, Luggage

Completion: December, 2001

Architect: Rem Koolhaas

Client: Prada

Program: 23,000 square feet in SOHO district

Ms. Prada, the client, said she suspected consumers had become bored with boutiques that were rigidly uniform in their design. She offered them a tourist attraction; a Prada "epicenter" designed by Rem Koolhaas. His work emphatically embraces the contradictions of architecture and urban design.

The most significant feature in the Prada store is the two big curves carrying through from the basement all the way to the ground floor. It creates a strong visual effect to connect the two floors. On the Broadway side, it is the curve with steps which directs one to the showcase which displays the garments. It can also become a seating area when there are special events. The other side is a smooth curve and there is a hidden stage behind, which can rotate out to form a performance space. (Figure 85) In addition, there is a path on the side where the shoppers can look over the display from the ground floor to the basement. The centerpiece is made of 180-foot zebrawood with a half pipe as its centerpiece. The stairs have been altered with the metal finished steps to produce a stronger effect for the basement floor. On the other side of the curve, there are metal cages with merchandise hanging above.

Figure 85 Main Showcase Area

As the shoppers walk down to the basement level through the big curve of wooden stairs, there are shopping spaces on both side - one side for the clothing section and another side for the shoes section. The spatial feeling at the basement level is totally different from the ground floor in that Koolhaas leaves the unfinished sheetrock as a contrast to the ground floor which is more glamorous and spacious. The clothing section is broken up into small sections with the "office file divider idea" which can adjust the space and the display sections according to the customers' needs. (Figure 86)

For the changing room, Koolhaas applied the latest glass technology of liquid crystal film. Therefore, it becomes opaque when an electric current passing through the film is cut off. It appears to be a two-way mirror, where the customers can see outside when they are trying the clothing inside, but they cannot be seen from the outside.

The large opening in the middle of the store is magnificent, and it is visually connected to the ground floor and the basement floor together. Conversely, it makes the basement level feel compact and dark. In this design, s $40 million dollars were spent in the renovation for decorating the 23,000 square feet of retail space. Since it was intended for high-end retail stores, it should have more showcase space for one-of-the-kind pieces rather than more retail space. Furthermore, there is the big round elevator with the seating bench around the side, which can hold at least 20 people. However, in my view, it is not necessary to have this type of elevator for a high-end store because it is rare to have twenty people use the elevator at one time. With this store's configuration and program, the elevator is too large to be accommodated in the store; besides, it also occupies a lot of retail space at the basement.

Figure 86 Basement

Moreover, the store design was intended to be changeable, but most of the things are fixed except the curve which can be transformed to form the stage. The featuring graphic on one side of the wall can be changed seasonally and is used by different designers to showcase their work. Although these changes are not substantive or dramatic, they can be utilized to make the store design more active and to alter the atmosphere of the store. With the corrugated translucent plastic board on one side of the wall to contrast with the wallpaper on the opposite side, together with the metal cages containing merchandise hanging in the middle, there is a perfect harmony of interior spatial effects for the store.

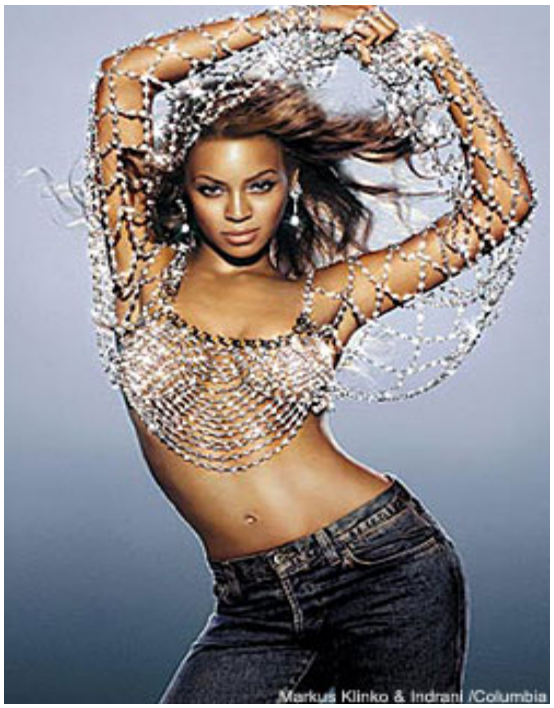
This is one typical example that can demonstrate the interesting spatial idea of movement circulation for shoppers. The design emphasizes the middle of the centerpiece for transporting shoppers vertically from the ground to the basement; and it also creates an intriguing narrow pathway to the other side of the store in a horizontal direction. Although the design of the visual effect is strong, it seems that the large unused space is inappropriate to design in light of the costly square footage.

In my point of view, the design with the intention to connect the basement level to the ground level is pretty good, if all cost factors and spatial usage are ignored. Being a high-end store, it does not require a lot of retail space. In this case, the store appears to be a museum rather than a boutique. Shoppers come to the store only to either look at the architecture or to purchase a one-of-the-kind dress, as a lot of the clothing is custom made. Therefore, the store does not need to have a large retail space, better to have a bigger showcase space.

Regarding the overall design, I was a bit disappointed with the minimal design of the basement as I went down through the centerpiece element. The basement floor gives people a tight and unpleasant feeling with its low ceiling and unfinished sheetrock. Even though the high technology of the changing room impressed me a bit, I would rather see something more in the basement than just the high technology fitting rooms. After all, the integration of architecture into fashion would raise the interest of shoppers; besides, the architectural design would also become an icon of the store and help it successfully promote the store brand.

9.0 Design Project - Residential Retreat

9.1 Client



Client's Biography

Beyoncé Knowles

On Stage	Off Stage
Sexy	Shy
seductive	Vulnerable
Provocative	Quiet
Aggressive	Well-behaved
Confident	Energetic
Sassy	Fresh/ young
Flirtatious	

Beyoncé Giselle Knowles is a role model for young people. People Magazine recognized Knowles as the best-dressed celebrity in 2007.[47] She has launched her own fashion line "House of Dereon" that mixes hip hop influences with feminine touches.[48] Beyoncé knows how to make and wear clothes that complement her body's curves. She is known for her nice hips and she likes to flaunt them in form-fitting, vintage gowns and to design dresses with slits from ankle to waist to show off her hourglass figure. Even when she is not walking on the red carpet, Beyoncé still looks fabulous in a tight pair of Dereon jeans. When she dresses down in denim and a simple top, Beyoncé adds a pair of big, chandelier earrings or a trendy bag to ensure her look is still sophisticated. She is fond of wearing plunging necklines and sweetheart style corsets – anything to

[47] Goldsmith, Belinda. " Beyonce tops fashion list| Entertainment| Reuters." Breaking News, Business, Financial and Investing News, Personal Finance & More | Reuters.co.uk. http://uk.reuters.com/article/entertainmentNews/idUKN12280023200709 13?feedType=RSS&feedName=entertainmentNews (accessed April 29, 2009).

[48] Goldsmith, Belinda. " Beyonce tops fashion list| Entertainment| Reuters." Breaking News, Business, Financial and Investing News, Personal Finance & More | Reuters.co.uk. http://uk.reuters.com/article/entertainmentNews/idUKN12280023200709 13?feedType=RSS&feedName=entertainmentNews (accessed April 29, 2009).

accentuate her assets. In any diva, her favorite fabrics are those that either sparkle or shine.[49] She is also a perfect fashion icon. Having such a model client, the house design should be unique to match with her on/off stage personality and life style.

She describes herself as a down-to-earth person and expresses that her choice of clothing will reflect her personality. "I would rather listen than talk. I would rather wear flats than heels. I would rather lie on a beach than shop." She also indicates that a beautiful woman is one who is confident and comfortable in her own skin. "I do not try too hard to be sexy and understated is better than overstated."[50]

Beyonce Giselle Knowles is both a thoroughly modern star and an anachronism.[51] In the presence of audience, she will appear differently and her shyness will be gone completely. Beyonce grew up in church with positive women around.[52] "My mother was strict about when she went to sleep, or whether she could go to a party.'[53] Therefore, she is used to seeing and doing things positively. She said, "If I do something wrong, I don't get emotional. I think about it, and I change it and fix it. I've always been very logical."[54] In fact, she is a family oriented person who cares and thanks her family members constantly for their support. Beyonce and Jay-Z just got married last year and have a new house in Scarsdale, a quiet New York suburb. It is a colonial-style house with 15,000 sq./ft. on two acres of land. It is completely different from the couple's current penthouse in the trendy TriBeCa district of New York.[55] She

[49] "Lifestyle | Style: Fashion: Get Beyonce's Look! | Lifestyle | BET.com." BET.com | The Latest Music, Entertainment, and Celebrity News and Fashions, TV Shows and Video | Official Site. http://www.bet.com/Lifestyle/Style/lifestylefashoinbeyoncelook.htm?Referrer=%7BF2038F42-FD70-4929-AF1C-981596CBCB21%7D (accessed April 29, 2009).

[50] "Lifestyle | Style: Fashion: Get Beyonce's Look! | Lifestyle | BET.com." BET.com | The Latest Music, Entertainment, and Celebrity News and Fashions, TV Shows and Video |

[51] "Beyoncé: The Ice Princess - Blender." Blender Magazine - The Ultimate Guide to Music and More - Blender. http://www.blender.com/guide/68386/beyonceacute-ice-princess.html (accessed April 29, 2009).

[52] City, Thomas Chau in New York. "Cinema Confidential News: 09/16/03 - INTERVIEW: Beyonce Knowles of "The Fighting Temptations"." Cinema Confidential - Upcoming movie news, gossip, interviews, reviews, trailers & more!. http://www.cinecon.com/news.php?id=0309162 (accessed April 29, 2009).

[53] "Beyoncé: The Ice Princess - Blender." Blender Magazine - The Ultimate Guide to Music and More - Blender. http://www.blender.com/guide/68386/beyonceacute-ice-princess.html (accessed April 29, 2009).

[54] " Cover Story: A Woman Possessed: Rolling Stone." Rolling Stone: Music News, Reviews, Photos, Videos, Interviews, Politics and More. http://www.rollingstone.com/news/story/5938330/cover_story_a_woman_possessed (accessed April 29, 2009).

[55] Tuesday, Showbiz | , May 27, and 2008. "Beyonce Knowles News | Jay-Z and Beyonce Build House in Burbs."

said she would like to have children one day. "If it was a perfect world, I would have two boys and a girl. I love little boys and girls are so much drama."[56] She wants to be normal. She wants to do something natural and unglamorous.[57] She does not want to feel void. She meets a lot of celebrities and notices the unhappiness underneath the smile. She said, "Happiness comes from family, friends, love and doing positive things." Moreover, she would like to jump into the water every New Year to let go of everything that happened before and start over again.[58] In the future, she hopes to have a life beyond the spotlight in which she can still find fulfillment. She wants to have a family and to be happy.[59]

Figure 87 Cause wear, evening gown, to party look

Figure 88 Beyonce and Jay-Z

Celebrity Actress Entertainment News, Photos, Videos, & More - Actress Archives.com. http://www.actressarchives.com/news.php?id=10661 (accessed April 29, 2009).

[56] " Cover Story: A Woman Possessed: Rolling Stone." Rolling Stone: Music News, Reviews, Photos, Videos, Interviews, Politics and More. http://www.rollingstone.com/news/story/5938330/cover_story_a_woman_possessed (accessed April 29, 2009).

[57] City, Thomas Chau in New York. "Cinema Confidential News: 09/16/03 - INTERVIEW: Beyonce Knowles of "The Fighting Temptations"." Cinema Confidential - Upcoming movie news, gossip, interviews, reviews, trailers & more!. http://www.cinecon.com/news.php?id=0309162 (accessed April 29, 2009).

[58] " Cover Story: A Woman Possessed: Rolling Stone." Rolling Stone: Music News, Reviews, Photos, Videos, Interviews, Politics and More. http://www.rollingstone.com/news/story/5938330/cover_story_a_woman_possessed (accessed April 29, 2009).

[59] Johnson, Caitlin A.. "Beyoncé On Love, Depression And Reality - CBS News." CBS News - Breaking News Headlines: Business, Entertainment & World News. http://www.cbsnews.com/stories/2006/12/13/entertainment/main2258069.shtml (accessed April 29, 2009).

9.2 Program

Program

The house is intended to be a vacation house for the client, Beyonce Giselle Knowles. It is a customized house to reflect her personality and style. Exterior design will be more glamorous to represent her status on stage and public image, while the interior will be more flexible and playful to reflect her interior personality. It is intended to be a two storied house to maximize the view and usage.

In my research, an interview is conducted with Beyonce Giselle Knowles to understand her expectations. Basically, she is a family oriented person and wants to have two boys and a girl in the future. She needs bedroom spaces for herself and future children. Since living and dining rooms and an open kitchen are the most important spaces for family gathering a bigger space will be allocated for this purpose. A swimming pool in the vacation house can provide a place for Beyonce to relax and reduce her work stress. Outdoor space is needed too for the children in future. Then, there will be an area for holding parties and dancing to entertain guests or family.

9.3 Site Documentation

ML# 2507158

TMK: 310350140000

LP: $4,288,000

Address: 3000 Makalei PIace

City: Honolulu

Zip: 96815

Regn: Diamond Head

Neighborhood: Diamond Head

Land SF: 24,554

Land Acres: 0.5637

Zoning: U 03-R10-Residential District

Height Limit: 25 ft

Flood Zones: Firm zone X

Historic Site Register: No

Lot Restrictions: None

Special district: Diamond Head special district- core area

State Land use: Urban district

Street Setback: None

Elem School: Waikiki

Middle School: Washington

High School: Kaimiki

Owner: Melen, Mark D

Lot Description: Wooded

Location: Dead End

Land Use: Residential

Easements: Driveway, other Utilities

Surface Road Frontage: Paved Road

Improvements: Irrigation Landscaped, Utilities, Walls Fenced

Description: Sunset view, quiet location

Occupancy: Single Family

Story Height: 1

Year Buit: 1939

First Floor living area: 666

Total Living Area: 981

Full Baths: 1

Bedrooms: 2

Lower Floor: 315 sf

9.4 Site and Context Analysis

Figure 89 Google map Aerial view of the site

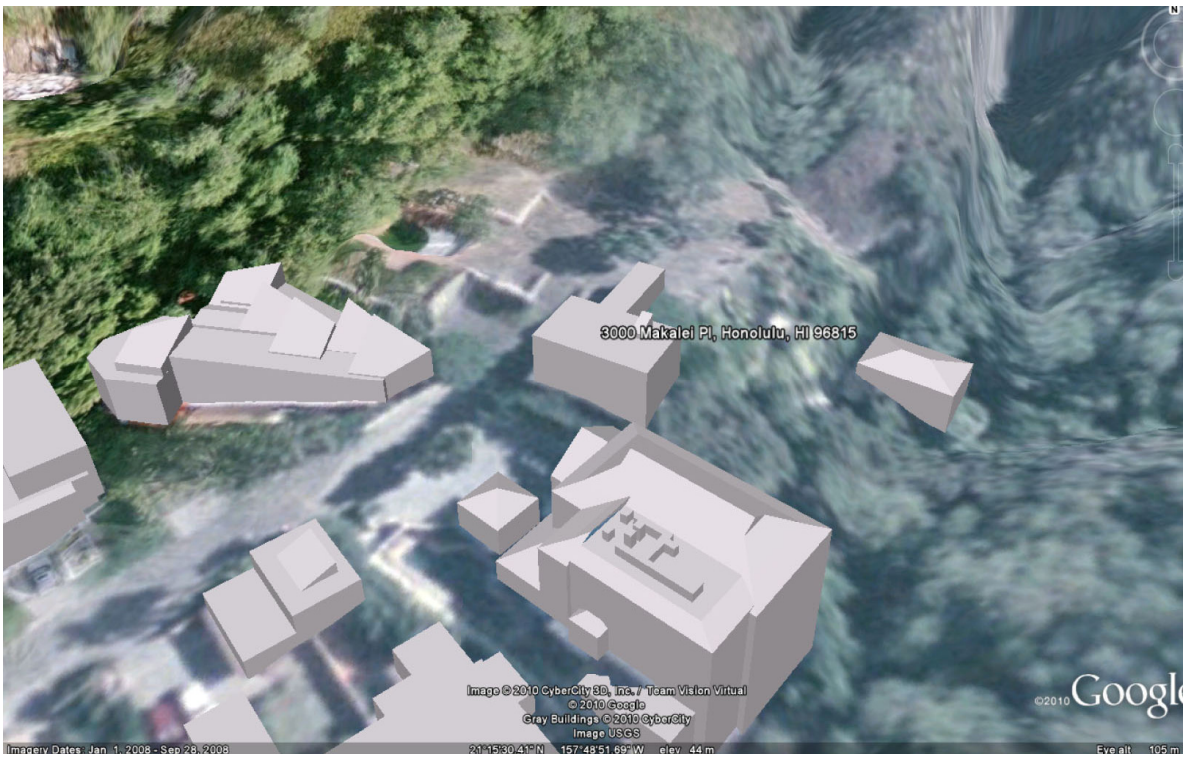
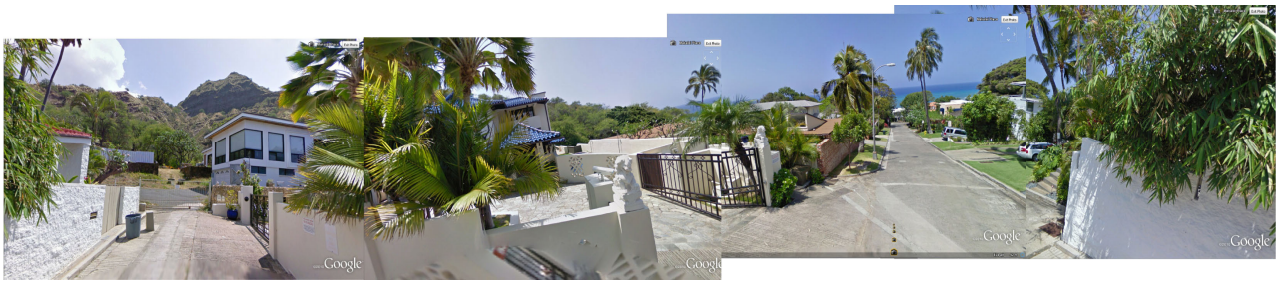


Figure 90 Google map- Site Close-up



Views

The site is completely surrounded by beautiful scenery. To the east is a cliff overlooking vegetation and another house to the north with a wide view of Diamond Head; to the west is more vegetation and trees, and to the south is the breathtaking view of the Pacific Ocean and the coastline. In the morning and at night one can see the sun rise and set on the ocean. Being on the top of the hill, neighboring houses can hardly be seen and therefore do not block the views.

Figure 91 Ocean View - Front

Figure 92 Mountain View- Back

Vegetation, Texture & Wildlife

A lot of vegetation, including various types of Hawaiian trees, bushes, and plants surround the entire site. Some of the vegetation includes desert plants that are part of a small garden in the middle. But while some of the plants are located on the site, much of the vegetation is along its borders. To the east are bushes and plants while trees cover the west and north borders. Beyond the borders to the northeast is Diamond Head covered with trees and to the northwest is a small forest-like environment.

Figure 93 Vegetation on the site

Climate

The site seems to always have some breeze or wind. Since the site is right next to the mountains, it can get very windy with wind coming from the northeast and Mauka side. The temperature at the site is also very cool with a temperature around 80F. Trees surrounding the site also block the sun and provide shade.

Water Feature

The Pacific Ocean provides a wonderful water feature for the site. The view of the clear blue ocean extends all the way from east to the west and disappears into the horizon. Even though blocked by some trees, there is a clear view of the ocean from any spot on the site.

Figure 94 Water Feature

Circulations

The site is located at 3000 Makalei Place in the Diamond Head neighborhood. It is only accessible by going down Diamond Head Road and up Makalei Place. Since Makalei Place is a steep hill, the way to get to the site would mainly be by car but it is possible to walk up the hill. The site is basically only accessible from that route because houses, trees, mountains, and a cliff prevent access from any other way.

Noise Sound

The noise that surrounds the site does not actually disrupt its environment but complements it. The wind, the ocean, and the birds chirping are the only noise from the site, which when combined provides a relaxing environment. The site is also in a residential area that is very calm with no noticeable noise from adjacent houses. Neighbors being located only in the front of the site also aid in the reduction of possible noise.

10.0 Design Model

Parallel study in architecture and fashion has been a recent trend and hot issue in both fields. Wrapping, Folding, and Transforming are the three encapsulated methods that enable the continuity of fashion transmission from the past to the future. These methods can be deployed in converting architecture formation. Wrapping is the simplest method for human body protection, while folding is another step forward on the base of wrapping technique that can create more interesting geometric spatial forms. Transforming is the recent trend to move towards the high-technology age with the combination of both wrapping and folding techniques into a new transition.

Both fashion design and architecture design deal with the creation of space and volume out of flat surface materials. Fashion designers have adopted the simple architectonic forms of circle, square, and ellipse to integrate with fashion technique, producing a fantastic combination of invisible geometric structural form for the garment industry. As a reversion, the study of fashion techniques of wrapping, folding, and transforming adopted into architectonic design will become a new trend in the architecture field.

The case study of Shigeru Ban's Curtain Wall House is a perfect sample of integrating fashion technique into architectural form, and transforming the wrapping technique of fashion and textiles into a rigid building façade to replace the hard material of metal, concrete and glass. In the case of Peter Eisenman, he applied the folding technique to create interesting lighting and shadow effects for both exterior and interior surfaces. Accordingly, the folding idea has added complex spatial experience to the interior space. These are typical successful examples of integrating fashion techniques into architectural forms.

In this research, I will take a step forward with the fashion techniques by not only emphasizing beauty and form, but also focusing on function and flexibility. The design concept of my doctorate project is mainly formed from the combination of fashion techniques of wrapping, folding, and transforming to explore the possibility for a building to change its clothes.

11.0 Initial Concepts

Design Inspirations

In order to make good use of the research material, I intend to design a customized house that can reflect the client's style, occupation, and personality. The concept behind this is to experience how fashion design techniques can be applied into our daily life, not just in public buildings or boutiques which have close connections with the fashion field.

The Doctorate project will be a vacation house specially designed for the client, Beyonce Giselle Knowles, who is a popular singer, actress, song-writer and designer. Additionally, she performs the role of being a sophisticated role model for the younger generation. She always expresses that her choice of clothing will reflect her personality. Therefore, this will be a good opportunity to study her clothing style and apply it into the house design. This house will be designed with the combination of her look on stage and off stage, giving glamour and yet, a young energetic look to match with her elegant style and age group. For the exterior design, there will be more glamour to represent her status on stage and public image; while the interior design will be more flexible and playful to reflect her inner personality.

Beyonce is a down to earth person who does not like to be over dressed, and she knows what to wear to complement her body's curves. Indeed, clothing plays an important role in her life. In view of this, the exterior skin of the house will be wrapping with nicely oriented curvilinear shapes to contour the simple structural frame. For the interior, there will not be fixed walls to define the functional spaces, but in applying the folding technique, there will be a lot of unexpected and interesting areas to manipulate with lighting and shading. Moreover, sparkling and shining materials will be used to match with the client's preference.

To experience the transformable fashion technique, the house will not merely have the look to reflect the client's style, but can also change appearance according to the client's preference or mood. Lighting will be another major element to be considered in my design. I will also apply the latest technology to design the exterior and interior enclosure for the transformation according to the client's needs.

12.0 Design Solution

S/S II - Architecture + Fashion

The final step is to design an architecture which unifies the ideas from my research into a conceptual model. Spring/Summer 2011 (S/S11) Collections - architecture + fashion is based on research in fashion design techniques on wrapping, folding, and transformation. The design idea for a residential house is based on the idea of how fashion could be applied to an architectural form; when adding a client with the site, the model creates a realistic result, not only with consideration to design techniques but also in how the design involves the client's style and the site condition. The following technique, style, and criterions are the conclusions I have made for the result of how fashion can be integrated into an architectural form.

12.1 Three Criterions of Architecture + Fashion

The incorporation of fashion into architecture is possible for both interiors and exteriors, and to the entire building systems. The essential obsession is the material selection. Material is one of the most powerful controls in the general design field; it is neither limited to architecture nor fashion. In architecture, material not only directly affects the entire design form or visual effect, but also durability. Material for architecture would always be better to be waterproofed in order to withstand various weather conditions. Realistically, materials in the building industry have large collections, and there are always new inventions. However, due to the cost, time, and liability, practical designs would rarely apply innovative materials. Materials selected are usually the long-established ones. For fashionable

architecture design, however, one has to spend quite amount of time on material research in order to apply an innovative material to dress up a building to enhance people's visual and emotional impressions. Similar to fashion design, different fabrics will create different visual effects on the same design. The only distinction between fashion and architecture is fashion is faster and produces an end product more easily. However, the design process is the same as with architecture.

A second criterion is the design and structural system. Form does not necessarily have to follow function. The function could be a set of structure or space. The form is based on function as a principle, but the shape could be totally different than the structure's frame. The structure is the core like a human skeleton; it does not change; it is a set object which could be self-supported on its own. It provides the basic shape for the outer skin. The outer skin need not be limited by the shape of the structure. It could be changed without affecting the core, or skeleton, similar to how people wear clothes.

The third criterion is a technical issue. All utilities—like mechanical, electrical and plumbing systems—have to be designed to be incorporated into the core structure. In a standard building, usually most of the mechanical, electrical, and plumbing systems can be hidden above the ceiling, below the flooring or behind the wall, but for the design with changeable skin, any fixable or major mechanical system should not be attached or affected when removing the skin.

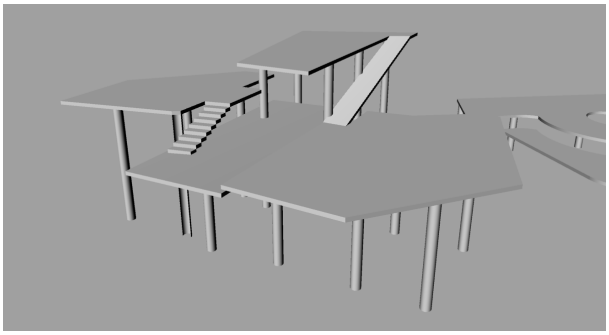


Figure 95 Floor plane are supported with the columns

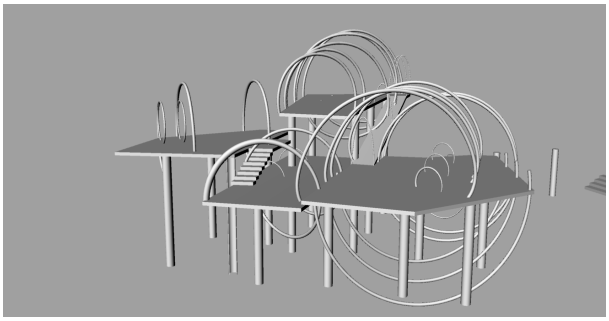


Figure 97 Framing wraps around the structure

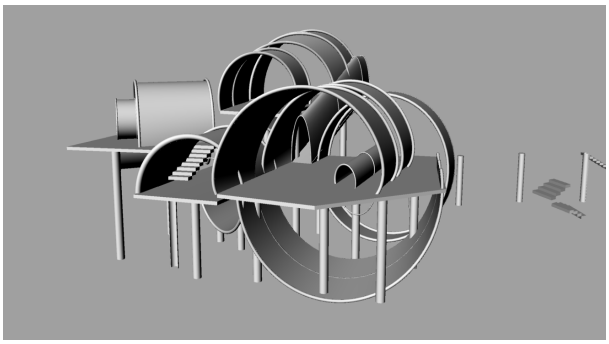


Figure 96 Material adds on top of the framing structure

12.2 Three Design Techniques

With wrapping and folding, it is flexible and easy to enclose any type of building. The technique has continuous repetition and does not have a set form. Transformation is essential with either of the design techniques of wrapping or folding. The changeability innovative perspective compared to traditional architecture. It is flexible for interior spatial configuration. It makes possible both physical and psychological light or spatial changes.

12.3 Structural system

The structural system is equal to the core of the body; it should be used simply to shape the entire building form. Tension structure was the first structure system that I began with. It has a similar structural characteristic to the needle and thread concept to construct the building form. However, this structural system of tension cable has too much control over the form of the building which took away from the idea of separate systems of skin and bone. Therefore, I started off with designing a floor plan and self-supported structure. The floor plate is designed based on the program, site condition, and the folding technique to create different spaces for the house. Since the floor plate is supported itself, the skin could be easily created with separate structure or a structure that could be removable for later renovation.

Structural Analysis

- Various Structures Approach

Figure 101 First Experimental Structure System – mimicking needle and thread in clothing construction

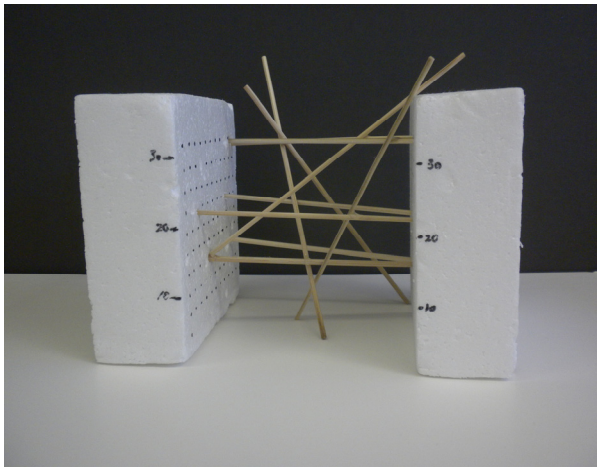


Figure 99 Spatial quality between grids

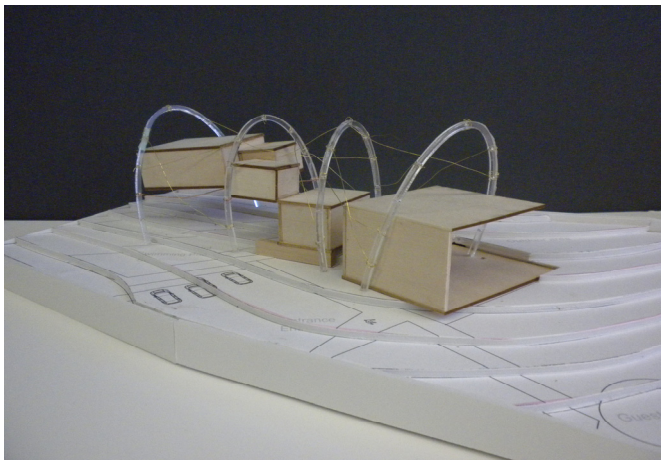


Figure 100 Space between tensile cables

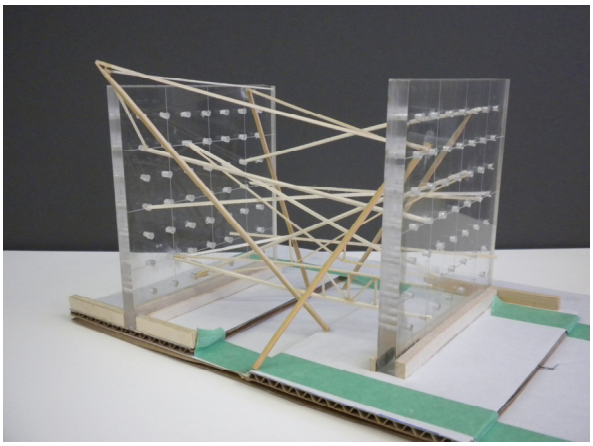


Figure 98 Developed Spatial quality

Three Fashion Techniques

- ‘Transformation’ in entrance and Dining area

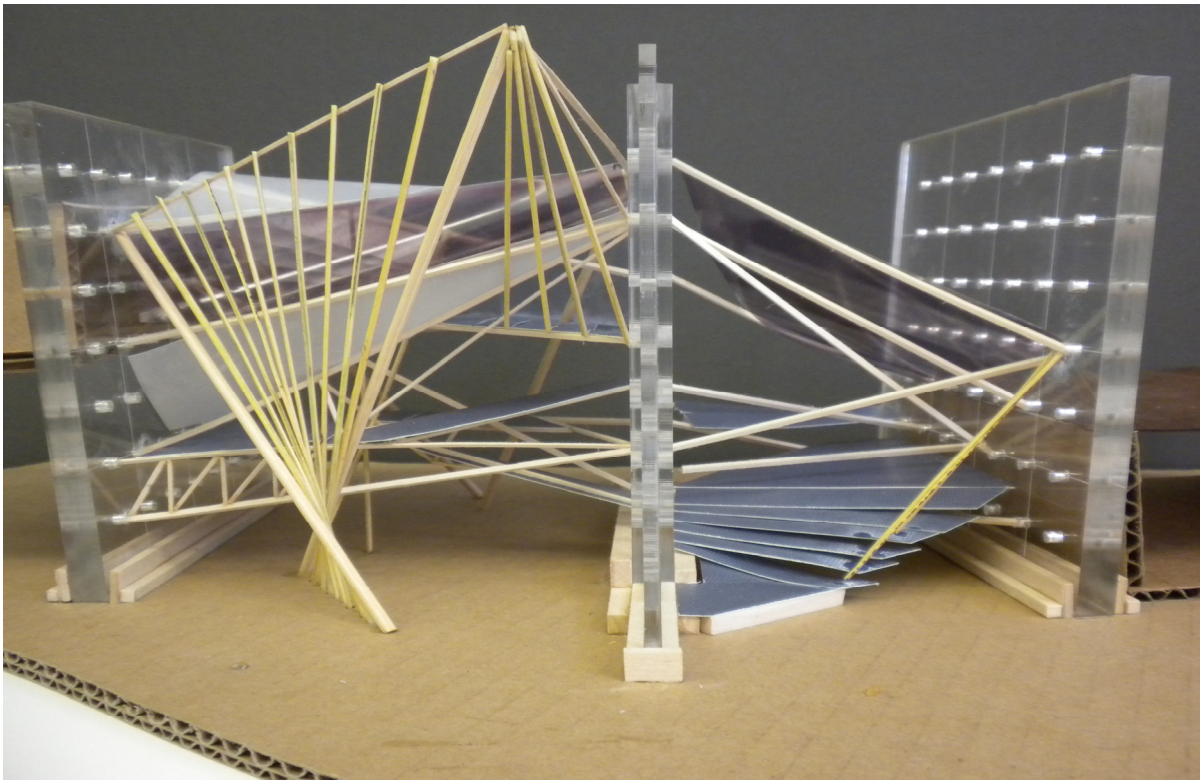


Figure 102 Conceptual Model

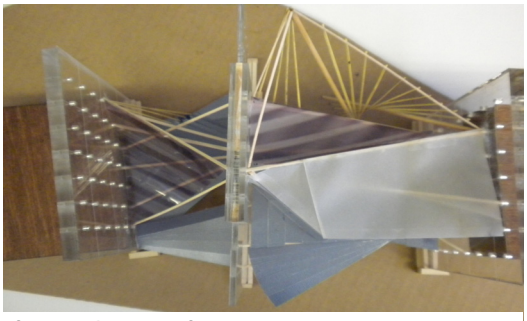


Figure 105 Top View

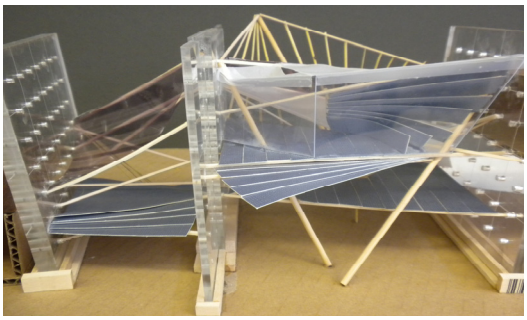


Figure 104 Musical Studio- Floor Transformation

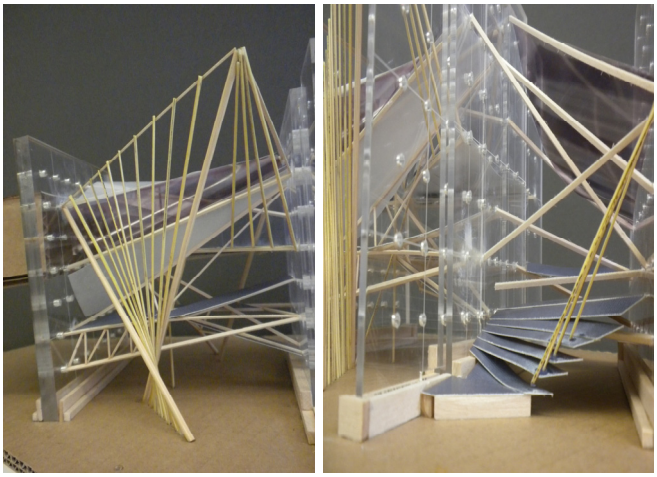


Figure 103 Transformation- Entrance and Dining Area

12.4 Wrapping Technique

The **Wrapping** technique is applied in the main spaces of living, musical and bedroom areas. Based on research and understanding of the client's style and habits, the client, Beyonce, is a singer and a fashion icon who always emphasizes curves and sexiness. This design focuses on experimenting with different wrapping methods producing curvilinear effects, exposure of open and enclosed surfaces to dress up different areas that represent the client's style.

The design approach in wrapping technique has one set of design collection, by using the same building materials, and a similar design style to wrap around different areas. The uniqueness of this design does not define the ceiling and walling parameter; at times the ceiling could integrate with the furniture or the wall could become part of the furniture. This design intent is drawn from my research studies in New York's boutiques. The design approach for the boutiques in NY has a great successful element of blending fashion and architecture together. Like one of the case studies, Longchamp used a ribbon form idea to wrap around two floors. However, most of the design is only limited to the interior. In this project, I extended the study not only limited to an interior, but also to the exterior.

12.4.1 Material

Material is one of the biggest considerations which will directly affect the design. Materials which I need to use are flexible, strong, and elastic, to encase different forms and shapes for the building structure, with similar properties to fabric. Metal has the qualities of durability and beauty. It is tough, can last long, and can be scrapped and recycled. Like Titanium zinc its lasts for up to 100 years and requires neither maintenance nor repair. Aluminum has negligible weight, as well as strength, elasticity and a resistance to corrosion. [60] The intent of materials chosen is based on the inspiration of fashion designer, Issey Miyake, in one of his collections with pleating. The pleating fabric creates a unique sculpture form when it wraps around a human body. Steel corrugated metal is chosen because of its unique property, similar to a pleating fabric which I hope will have a similar result in a sculptural

60 Meyhöfer, Dirk. Magic metal buildings of steel, aluminium, copper and tin ; projects selected. 1. ed. Berlin: Braun, 2008. Print.

form when it wraps around the building. Metallic coated sheet steel formed to a finished shape by passing the metal sheet through an engineered set of rollers by a metal fabricator.[61] Parallel to fashion design, corrugated metal has a similar character to a roll of fabric which is flexible and continuous. Moreover, the material color of metallic is one of the favored colors that the client Beyonce likes and wears a lot of the time. In 2010, Beyonce frequently wore stiff fabric which defined the shape of the garment. The challenges for corrugated metal is that it has its own unique properties and grid which could only blend or twist in certain direction, like the pleating fabric in garments, and it has to follow its grain in order to wrap smoothly in the garment. The other reason I chose this material is to understand each material's limitations and properties. Similar to fashion design, the designer has to understand each fabric's properties and has to make adjustments to the design when they cut out and construct the material together.

61 "Corrugated Metals | Roll Forming Glossary | A-C." Corrugated Metals - roll forming, industrial roofing and siding. N.p., n.d. Web. 11 Nov. 2010. <http://www.corrugated-metals.com/glossary.html>.

Material

Fashion Inspiration

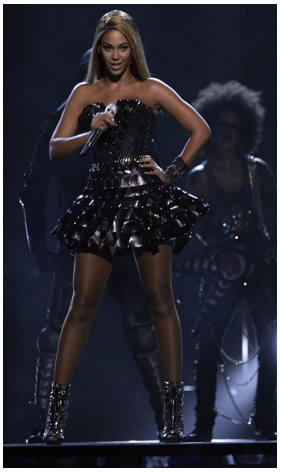
Feature

- Pre-pleated pattern
- Pleating in one direction
- Flexible and light
- Strong form
- Rotate grain to match body structure

Client –

Beyoncé Knowles‘s 2010 Style

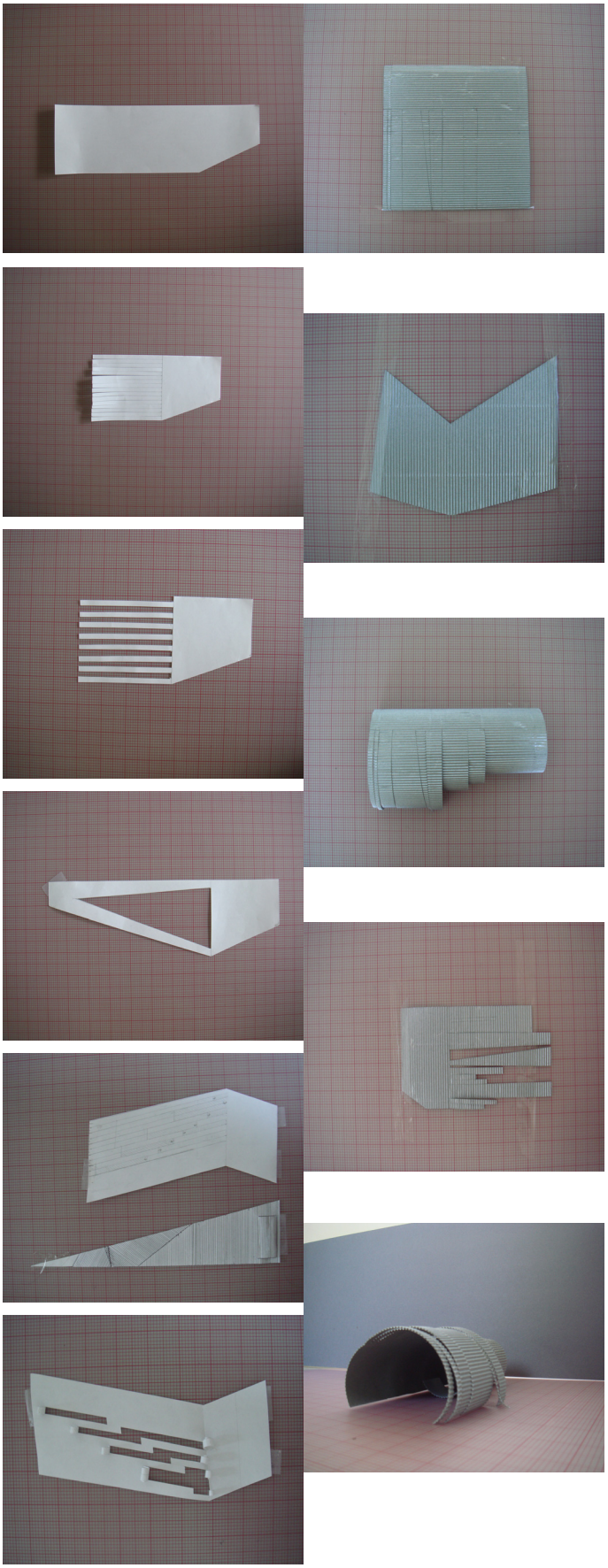
- Stiff fabric- emphasizing on form and pattern
- Color- Metallic
- Form- strong curvilinear shape and angles



12.4.2 Design Process

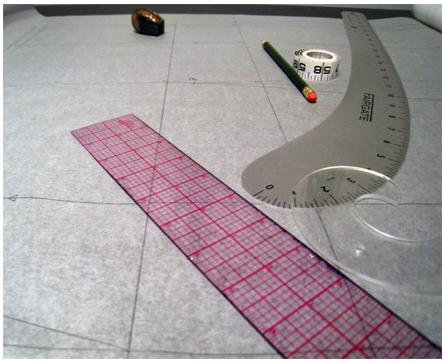
The process of designing with corrugated metal has given me a unique opportunity to gain experience working with a challenging material. I need to go through the same process the fashion designer does. First I need to create a block, to show the horizontal lines of the floor plate. Parts of the block in the floor plate area I marked to indicate where the blending, folding, or the separate pieces of material will be attached to one another. Multiples wrapped are cut and attached to the floor plate which is the main support for the wrapping. In some areas, the wrapping would penetrate into the floor plate to create interest; it also builds different perceptions for the user to look at within the architecture—that ceiling, wall, and flooring could be joined, sharing one form. The ceiling height, wall size or location all depends on how it wraps and how big the loop of the curve is.

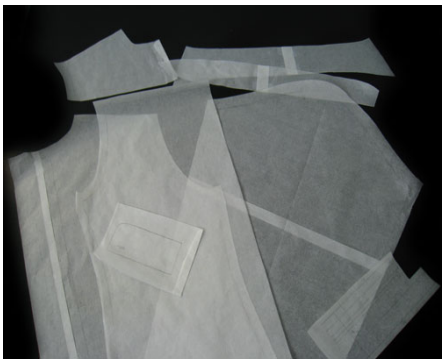
The end result of the design happened to be similar to Shuhei Endo's design work because of the material used, of corrugated metal, and also the restriction of the material properties. The difference in my design approach is focused on experimenting with a different wrapping method, so different areas wrap differently instead of having one continuous wrapping form. Instead of taking a continuous wrapping form, the material is cut in certain way to accommodate wraps running into one another. The wraps produce a continuous sensation within the design, to allow the material to curve in different directions to create a sculptural form.



Construction Processes

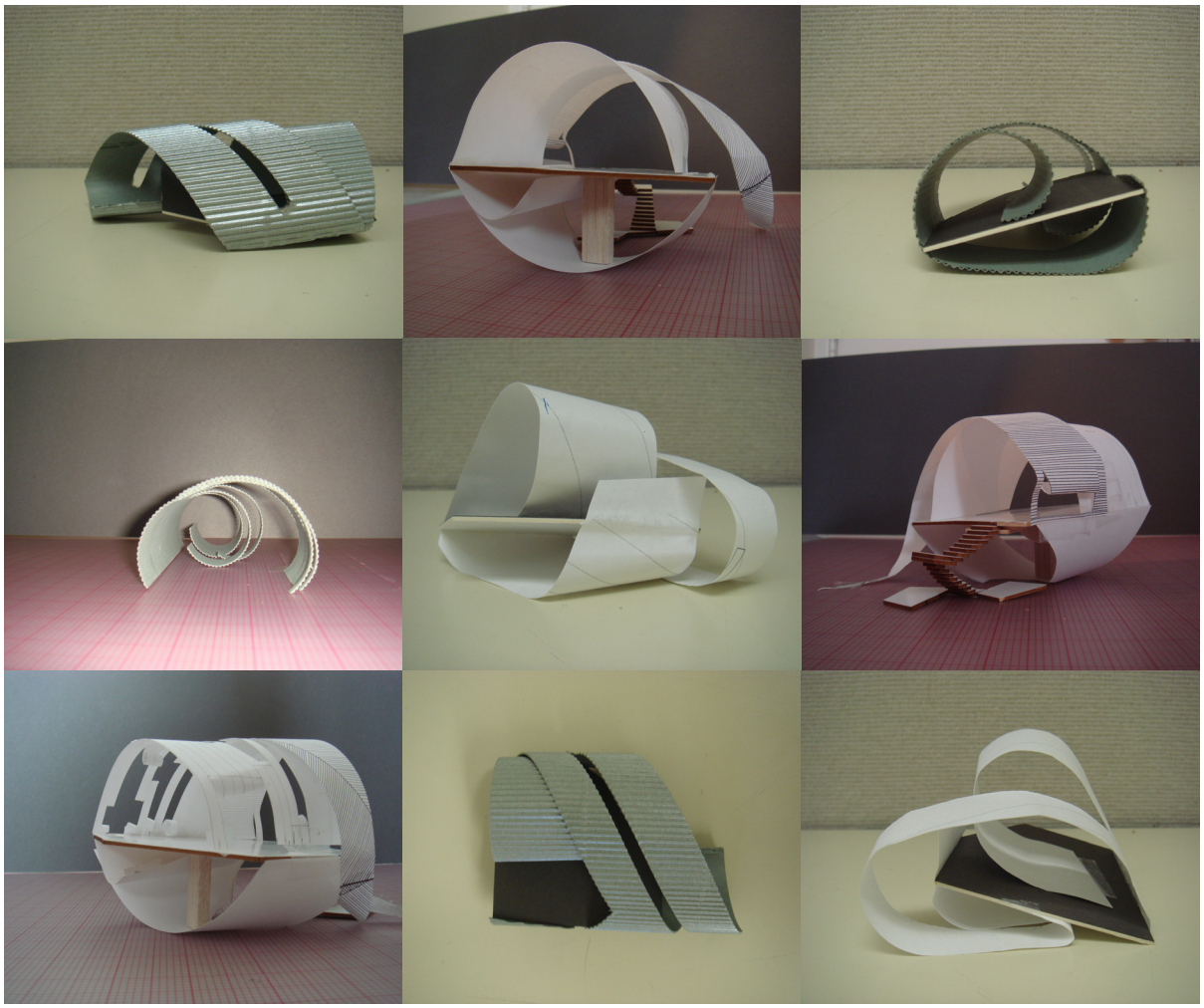
- **Blocks and patterns**





Architecture vs. Fashion

Design Process – Wrapping



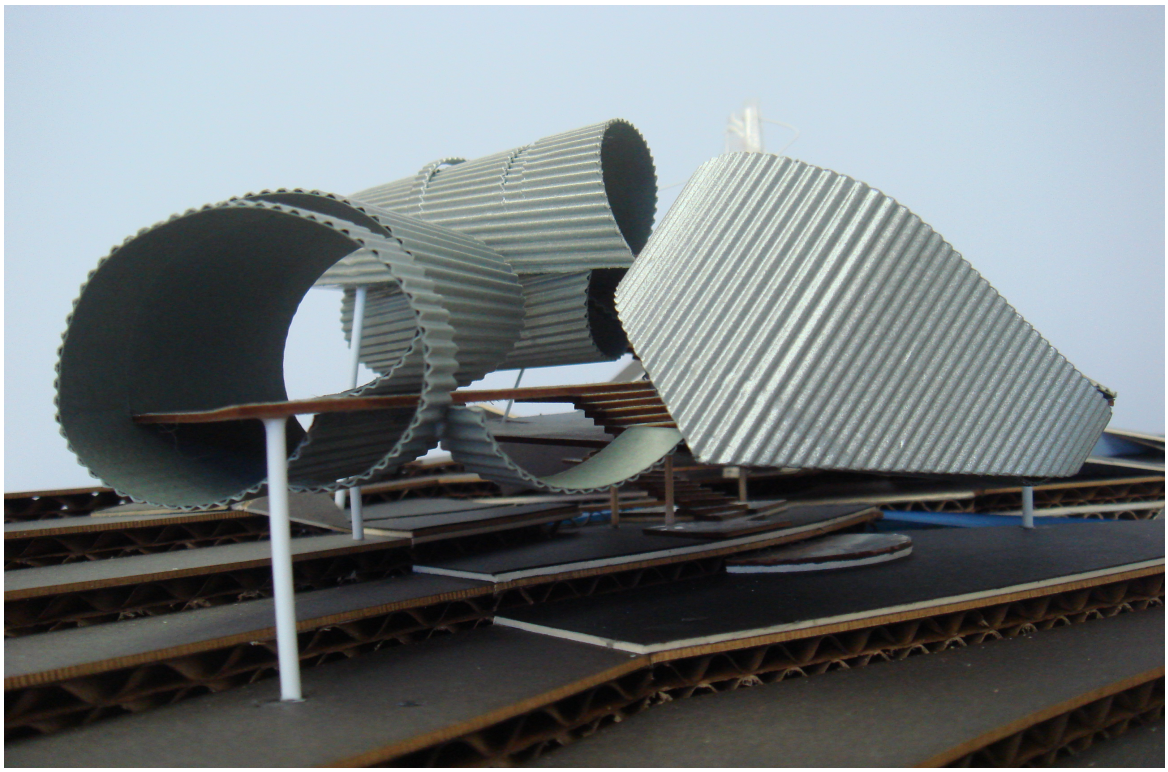


Figure 110 Concept Model – Experiment different wrapping styles into a building form

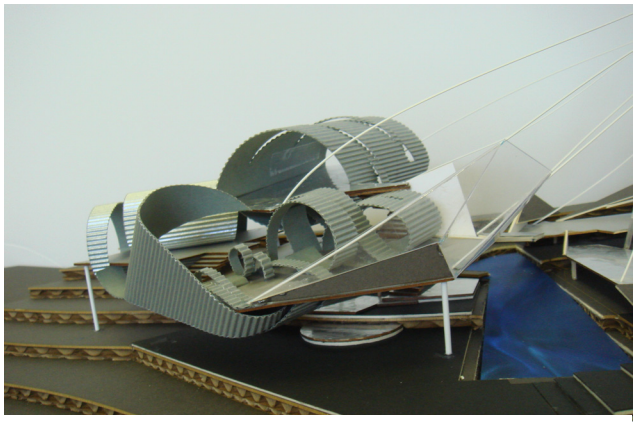


Figure 107 Front view

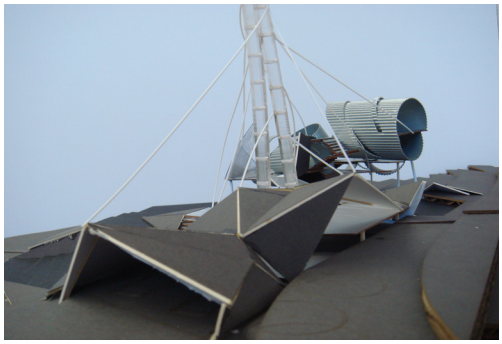
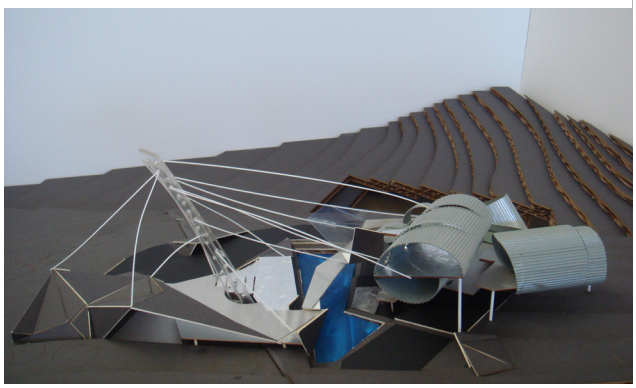


Figure 109 Folding technique



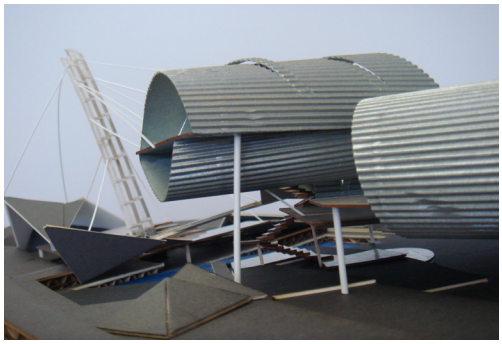
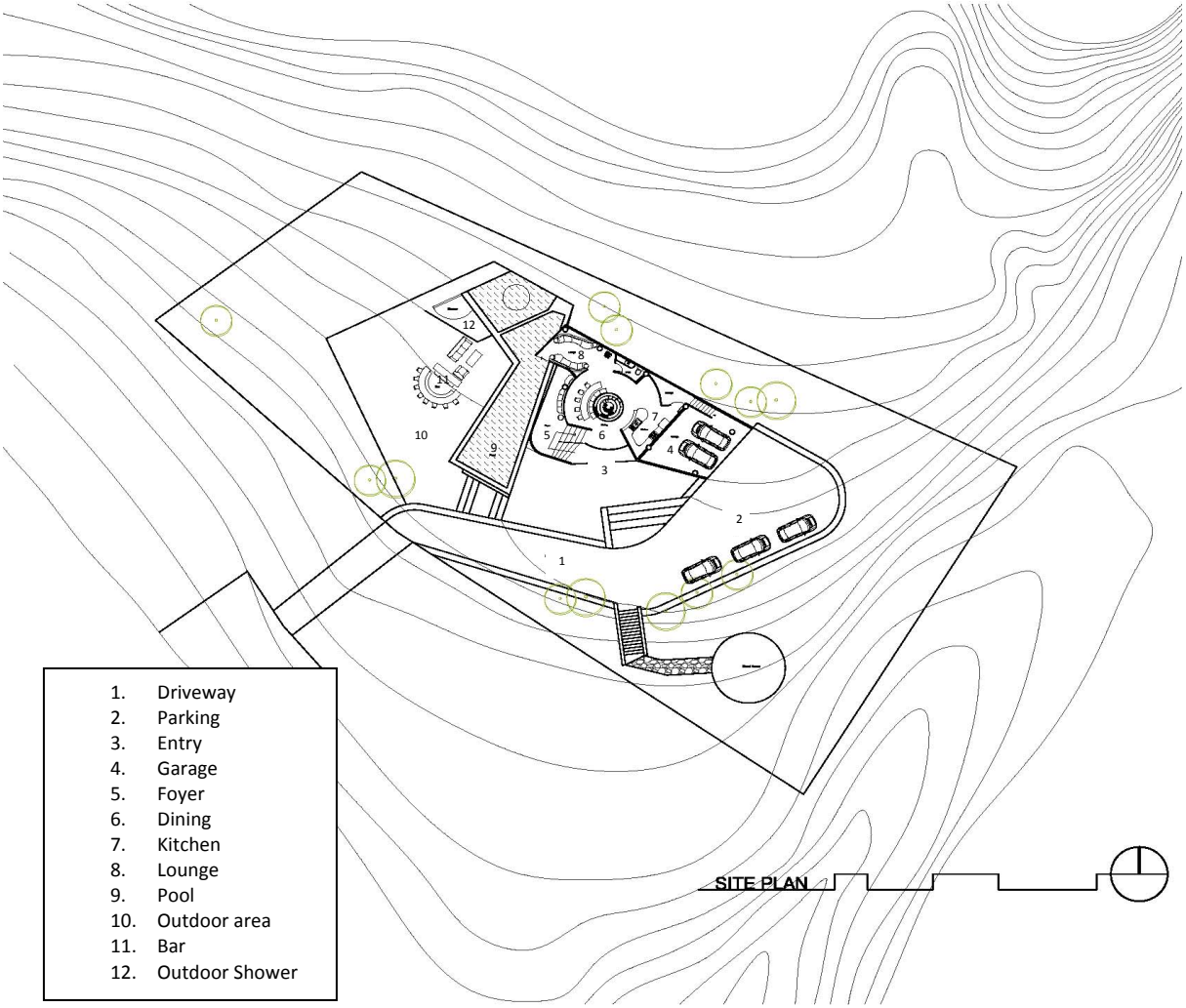


Figure 108 Back view

Figure 106 – Three design techniques

12.4.3 Plans



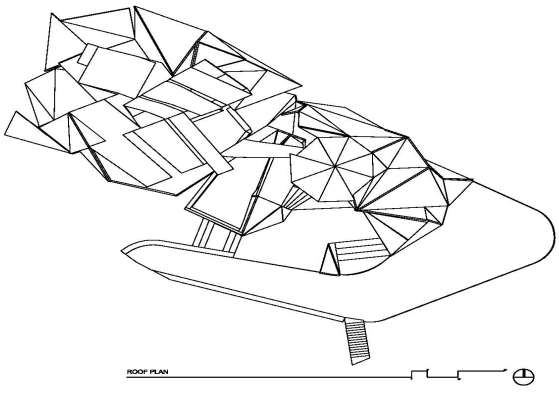


Figure 111 Roof Plan

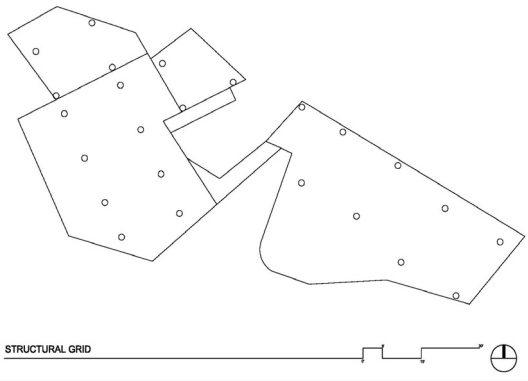
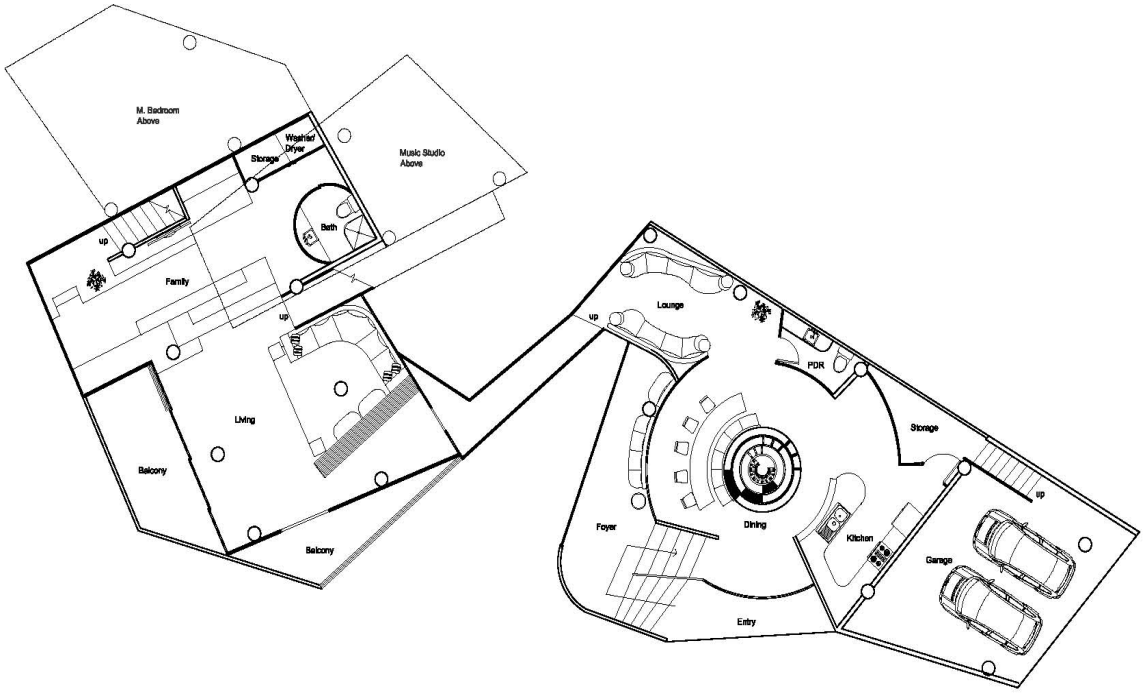
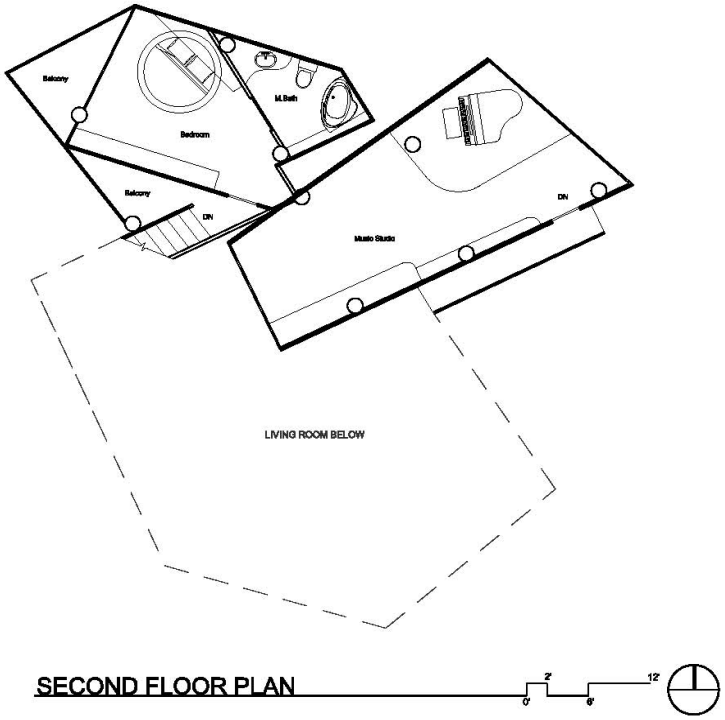


Figure 112 Structural Grid



FLOOR PLAN



SECOND FLOOR PLAN

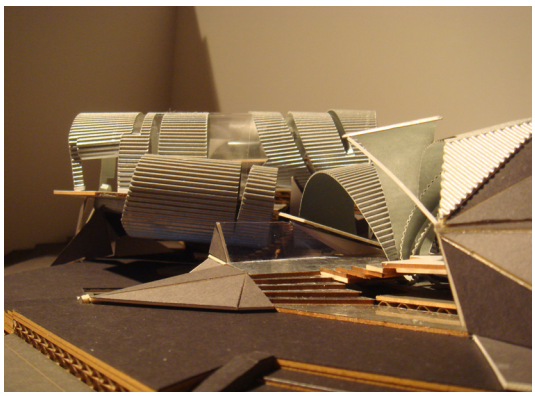
12.4.4 Design Approach

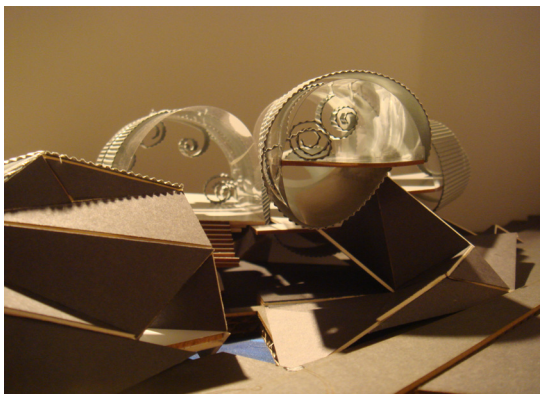
The **living room** area is the biggest and most common for the user. It happens to have the biggest wraps compared to the other areas, since the floor area is the largest. First, wrapping started with one simple tube form to get a roughly dimensional form and material size. From there, it was modified and cut into three different segments. The first wrap ties up the ramp from the dining area to living room to provide a sensation of continuity and a visual effect. The second wrap was meant to tie the ground level bar area to the second-level living area. The wrap was stopped and ended as part of the railing for the balcony.

The third wrap brought the wrap into the interior as part of the furniture. After the major segments were adjusted, next came detailing the wrap by cutting the biggest segment in half to allow natural sunlight to penetrate into the house. Moreover, right next to the living room, there is a common area which could be part of the living room or it could be converted into a children's room depending on the user's needs. The wrap's simple form aligned with the living room, yet the interior partitions could be adjustable by them rolling up and down. This is one of the unique properties that corrugated metal has as part of the design. The interior space would become a fun and unique space unlike the traditional partition which can only move sideways.

Figure 113 View from dining room to living room

Figure 115 Digital rendering- Front view of the living room





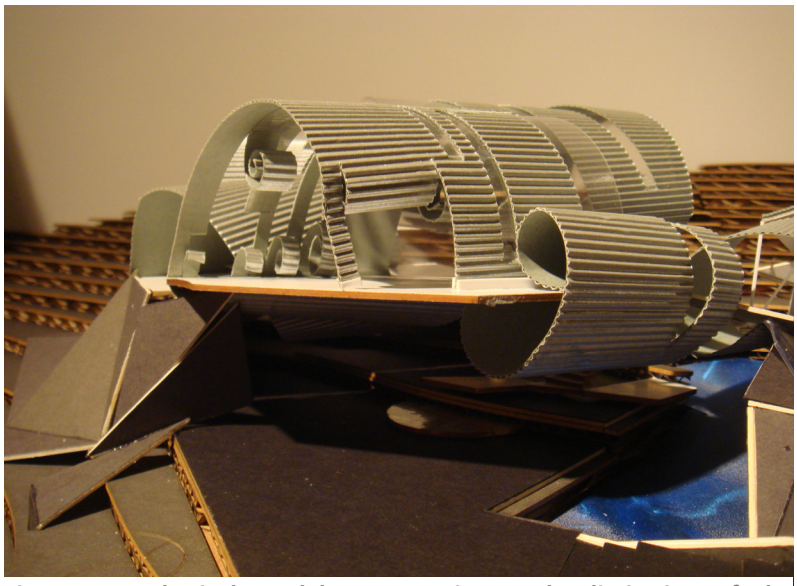


Figure 114 Physical Model- to experiment the limitation of the corrugated material

Walking up the ramp to the **musical studio**, one finds one of the most important spaces for the client. The shape of the musical room mimics a musical instrument: the tuba. It's narrow at one end and becomes bigger on the other end. In this design, the narrow end will provide privacy to the user; and also, the bigger opening at the back facing the mountain side could minimize noise disrupting neighbors. For the wraps, similar to the living room, I first started with the basic tuba shape, and then modified the wrap according to the horn shape. There are two simple ways to wrap the horn shape—the cut for the material should be in a trapezoid form, to form a shape which has smaller openings at the front and bigger openings at the other end. The other method is to divide the material into three segments with different lengths (of the wrap) to accommodate the diameter for the circles. In this way the wrap in between each wrap could become windows within the space.

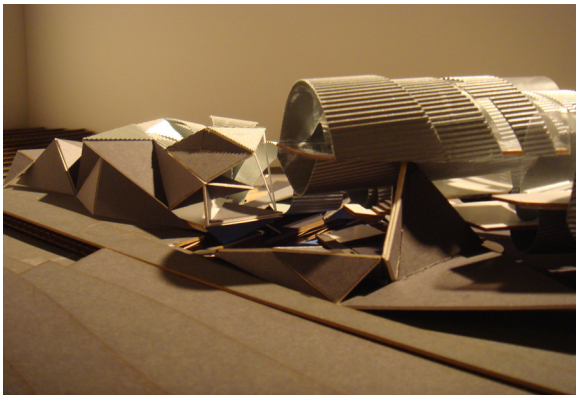


Figure 116 Wrapping Technique in Musical Studio

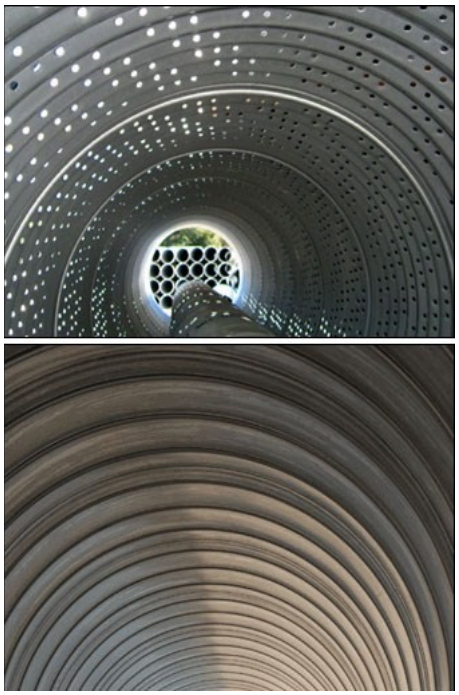


Figure 117 Material Illustration for the interior view

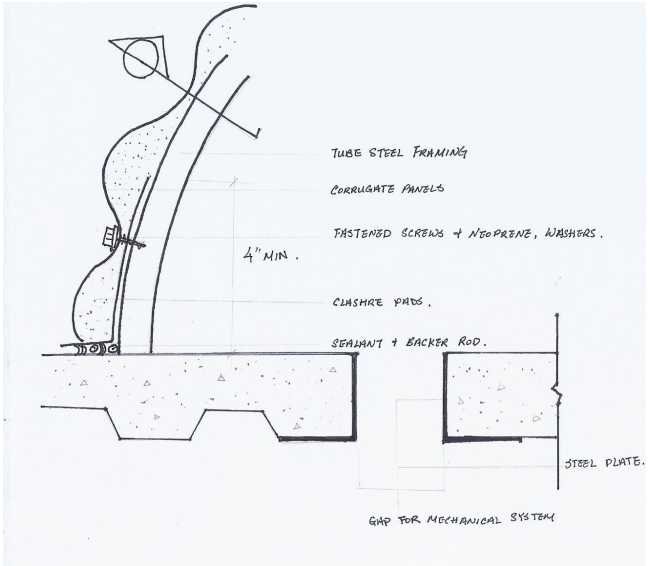


Figure 118 Details- Corrugated Metal Panel Framing System

In the **bedroom** area, I tried to wrap the floor plate in an angle. This gives a different perspective and style for the entire look of the room. The bedroom is the smallest area, in order to maximize the use of space. I minimized several curves inside the space. But, I still wanted to give a bit of character to the area. Therefore, one smaller wrap is added in the front as a decorative element to be part of the balcony space.

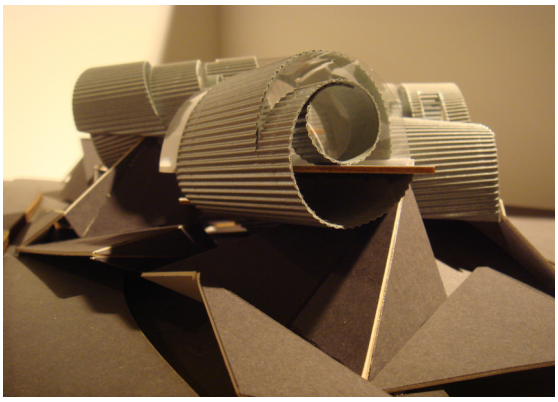


Figure 120 Bedroom Front View

Figure 119 Bedroom Interior View

12.5 Folding Technique

Folding is another technique which I applied to the design. Folds in this experiment generated new connections to the surface. However, wraps and folds, both have strong characters. There will be a sort of competition with each other if combined. As a solution, I blended the folds into the landscape and treated the folds as a secondary design element; yet, they tie up the relationship with the mountain at the back of the property. Also the folding technique merges with the floor plate, so that the wrapping and folding could be part of each other. The folds are formed based on the shape of the floor plan and also the height of the space needed.

The folds are formed with a triangular pattern. Again, this is one of a few experimental designs. Therefore, it would be better to keep it as simple as possible. Yet, folds could be formed into different geometric shapes with different patterns. The design of the form will change according to the angle, size, and number of folds it creates. There is no set of pattern or limitation. As long as one shape of the geometric is following another, it will be continuously growing. It could be framed in steel structure with panels on top of it. The users could make changes according to their needs or preferences if they want more open spaces.

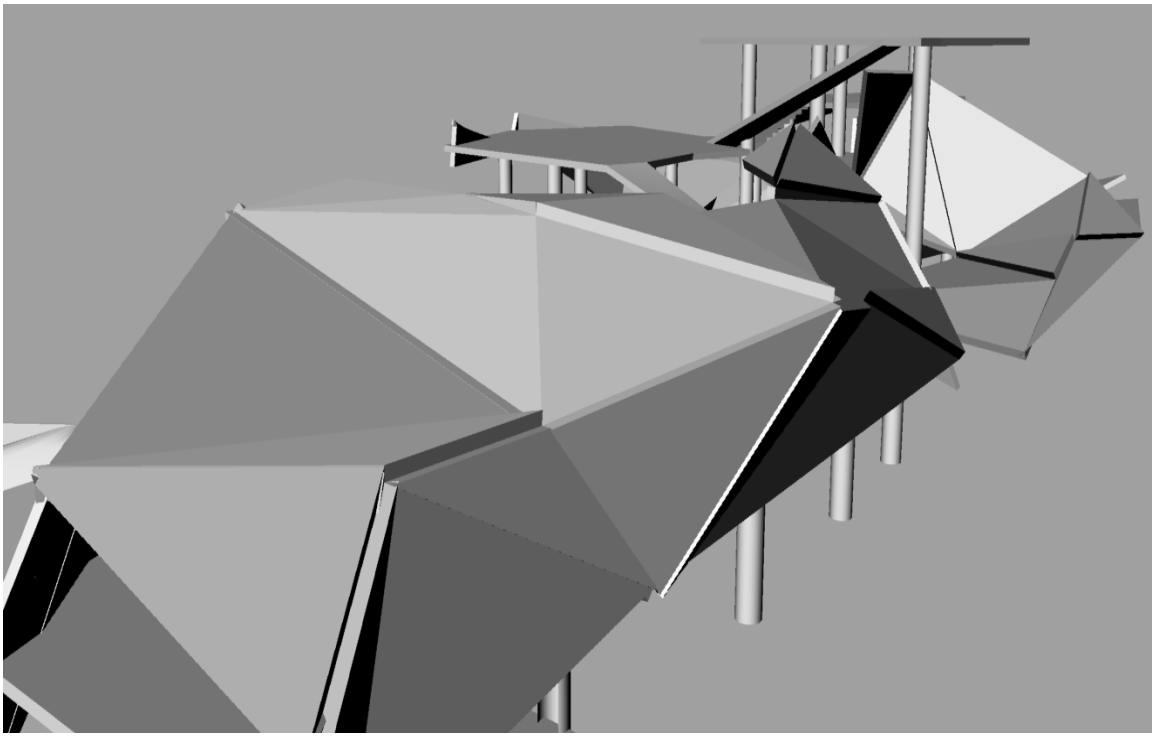


Figure 121 'Folding' - Dining Area

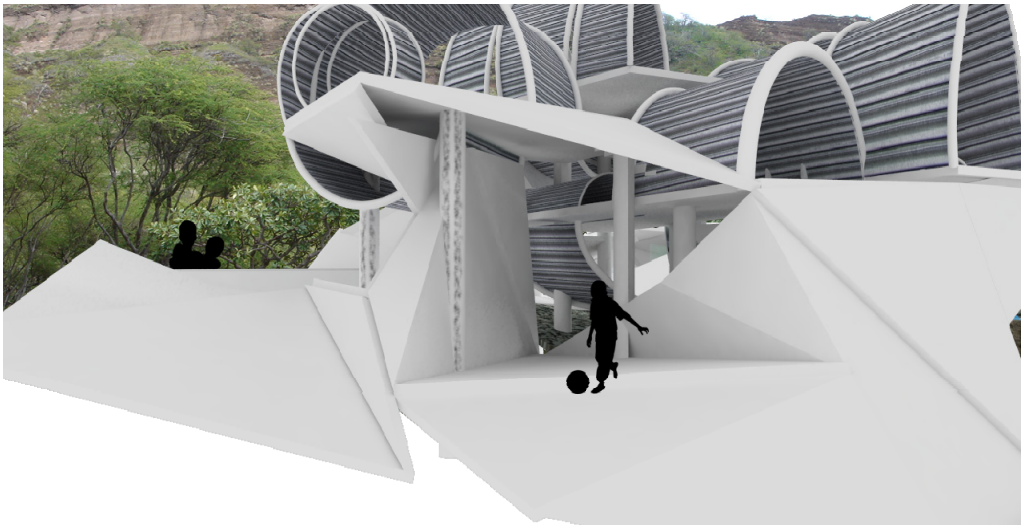


Figure 123 Rendering- Folding technique merge with landscape

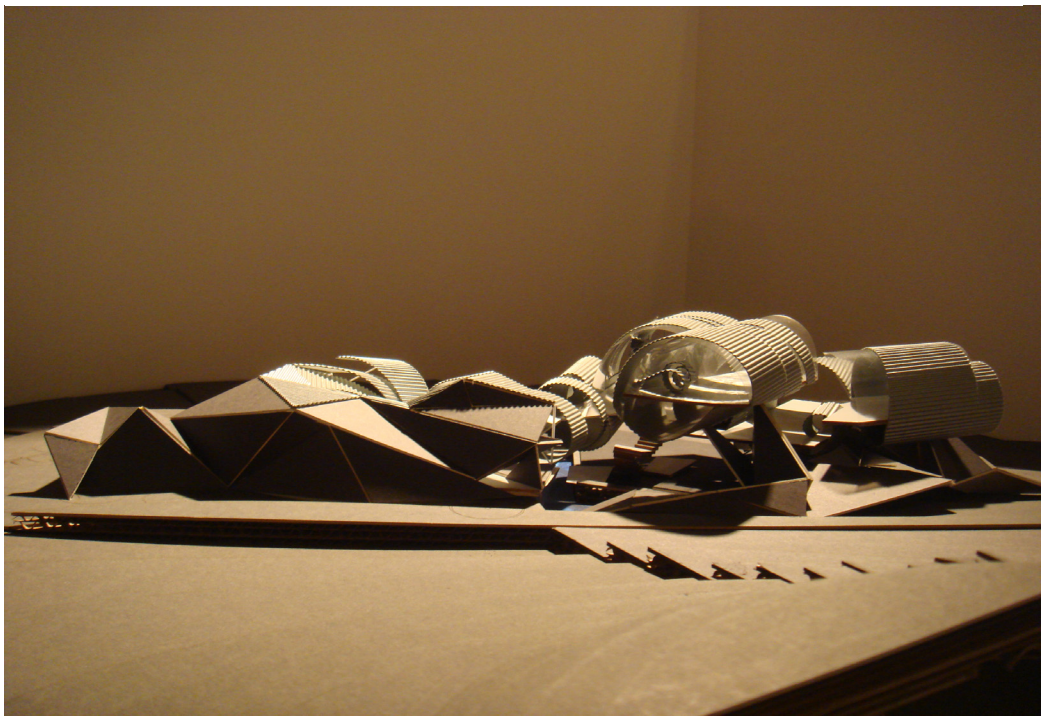


Figure 122 Physical Model- Back View

12.6 Transformation Technique

The **Transformation** technique is incorporated into wrapping and folding. The entrance and dining areas are considered public spaces for gathering. The space could be partially open or enclosed when needed. For example, by using one of the folding methods—a fan idea: to have the roof transform according to the weather conditions and users' needs. Another design with transformation is incorporated in the wrapping, by taking advantage of the material—corrugated metal. The interior could be transformed with rolling the material up and down as a shade or partition. Usually the wall partition is sliding side-by- side, horizontally; but in this transformation the wall partition will be rolling up and down.

It all happens to start off from a flat surface, and depending on how the wrap or fold is it will transform from one plan to two plans and to a three-dimensional plan with volume; from a simple roll of fabric using wrapping and folding techniques in a curvilinear form there could be many different varieties of design. The design could create complex spatial relationships, as well as affecting the interior and exterior form. This design project is only one of the design solutions to create and to prove that buildings can wear a dress by using fashion design techniques. The unlimited continuity of wrapping and folding, in the inverse relationship, could be quite useful to consider in architectural design, as it has many possibilities for applications.

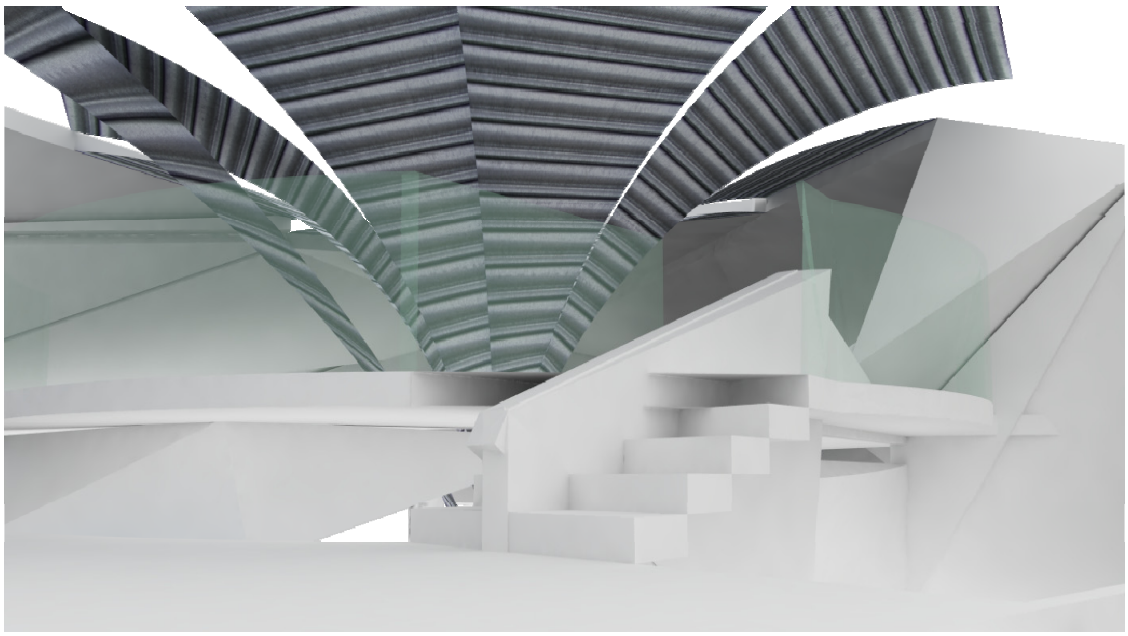


Figure 124 Transformable roof

Transformation + Folding

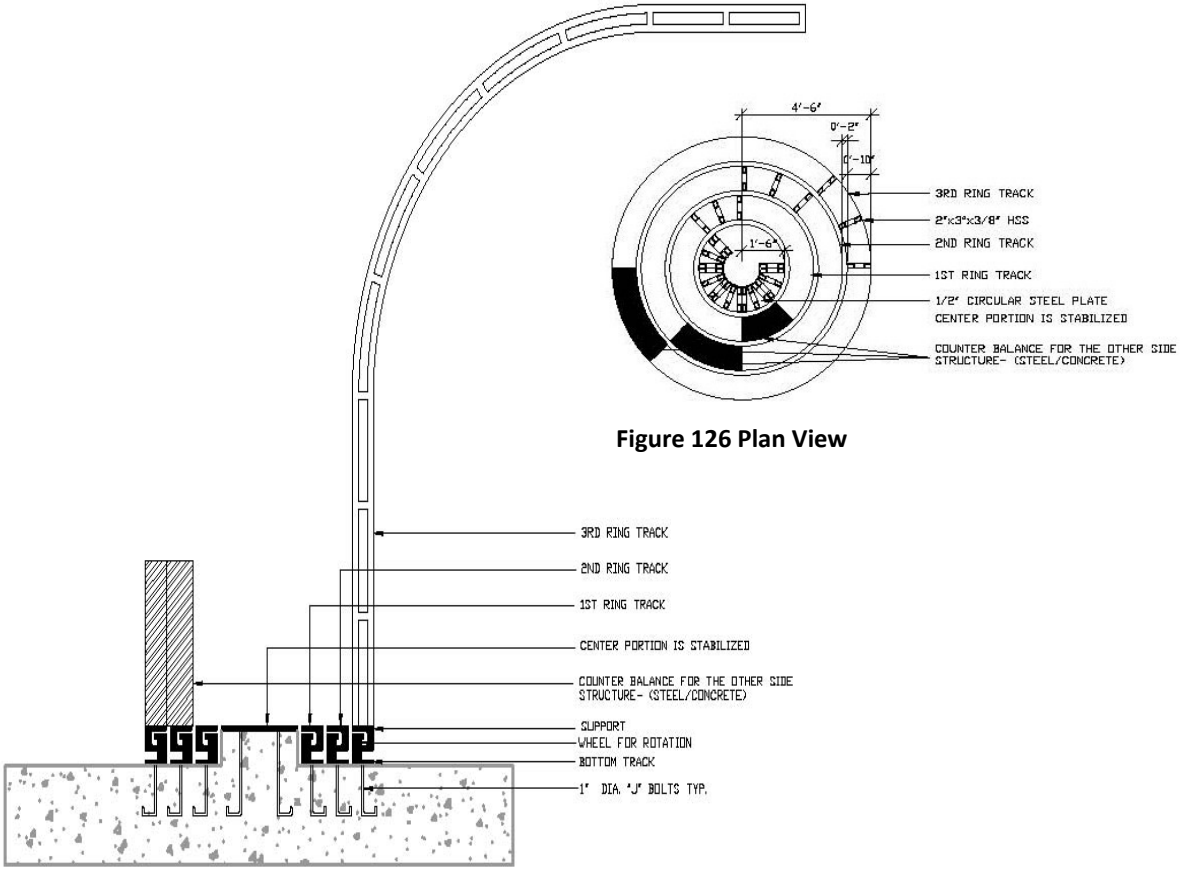


Figure 126 Plan View

Figure 128 Section

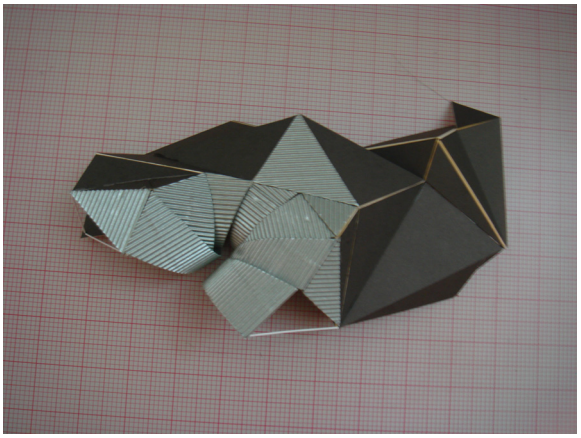


Figure 125 Study Model

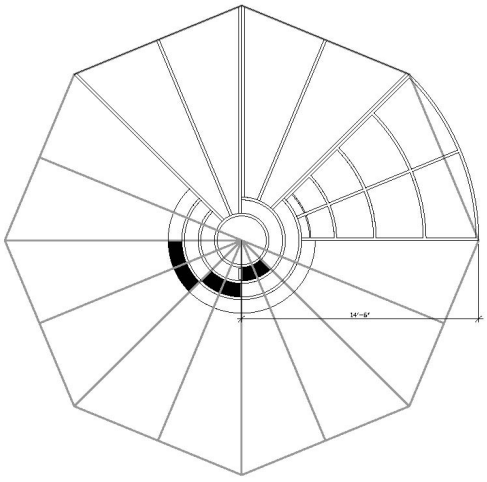


Figure 127 Top View

12.7 Digital and Physical Modeling

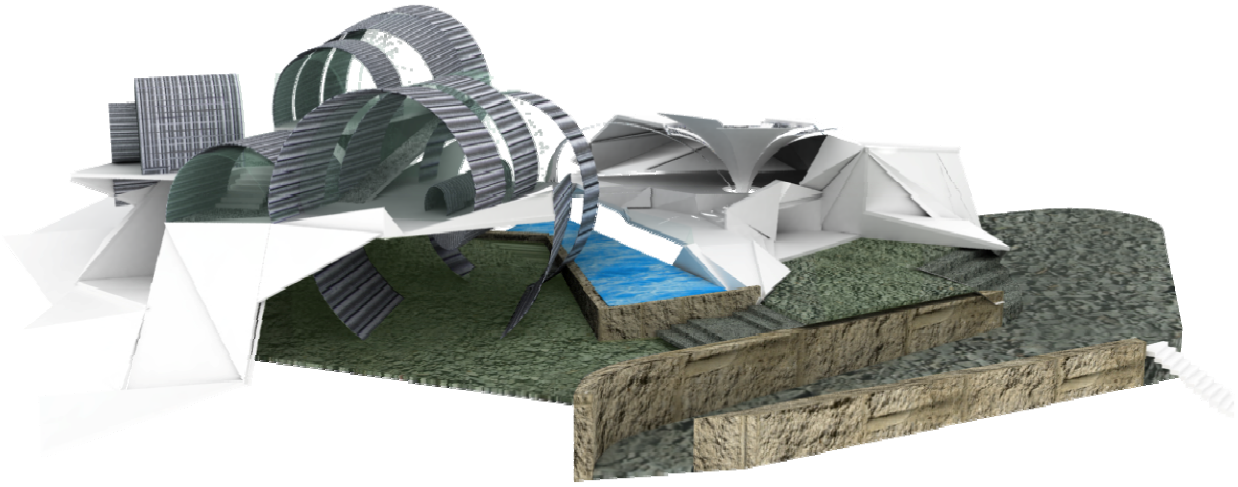


Figure 130 Digital Rendering- Front View

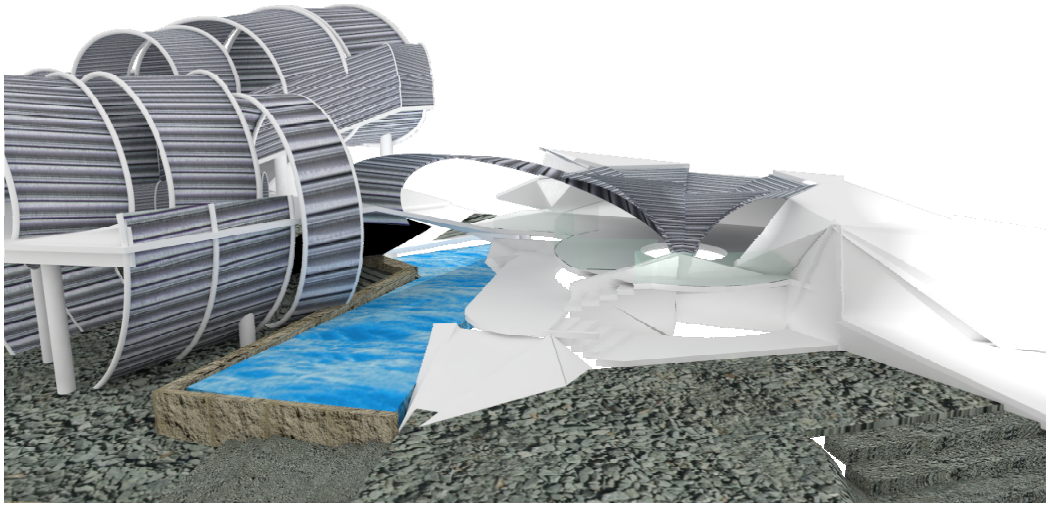


Figure 131 Entrance Area

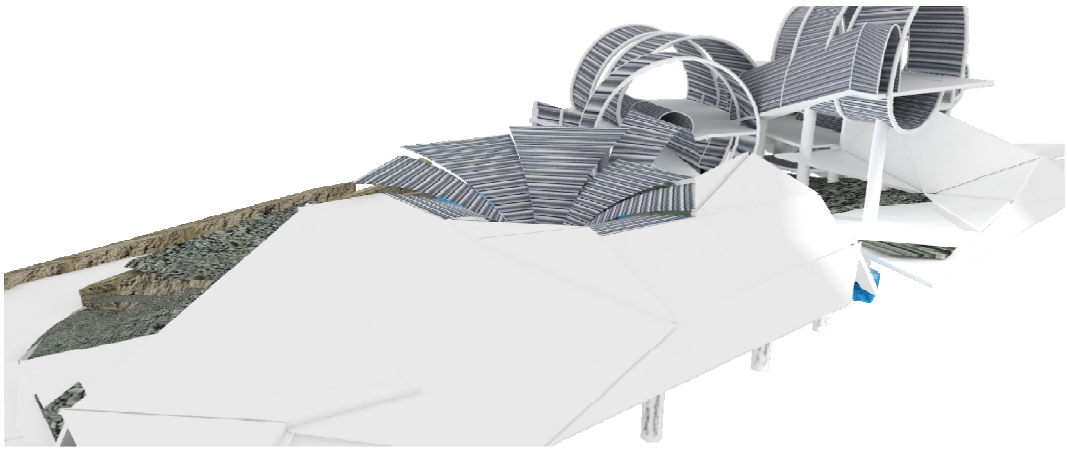


Figure 129 Back View

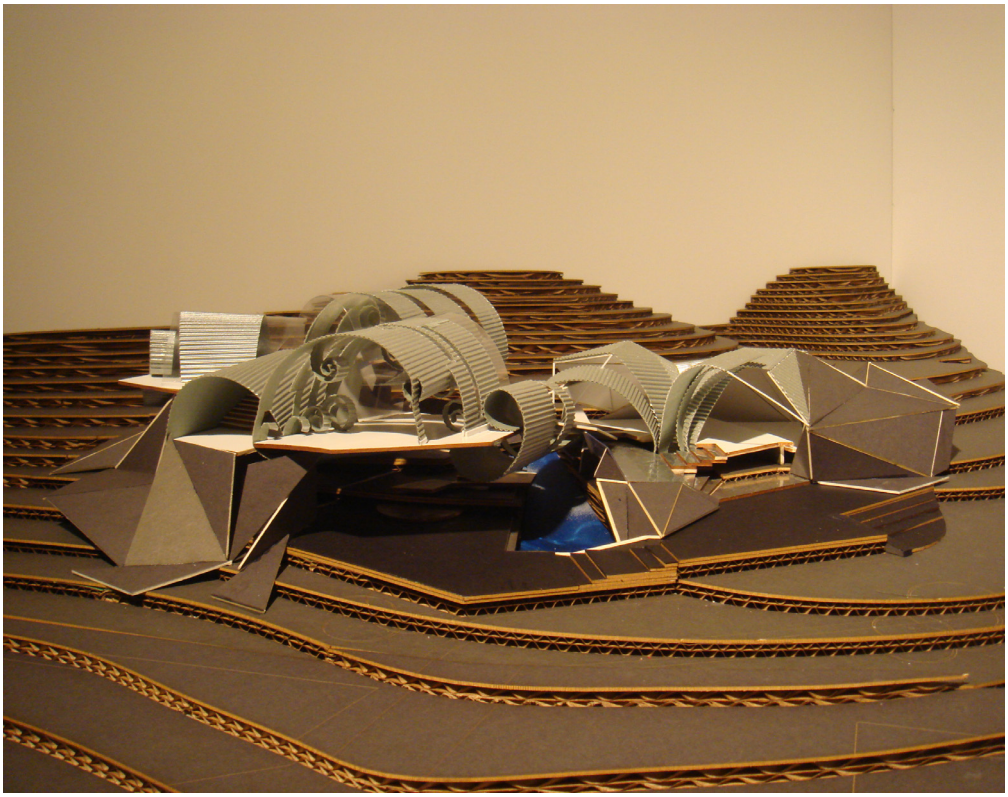


Figure 132 Physical Model- Front View

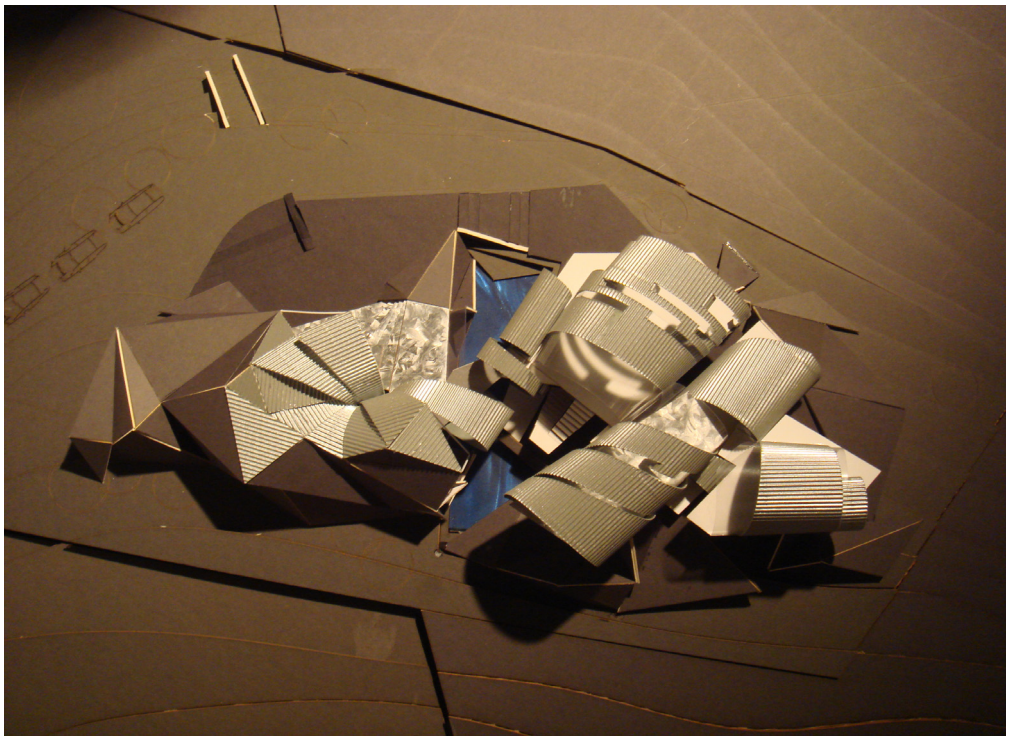


Figure 133 Physical Model- Roof View

12.8 Conclusion

This research effort has revealed that fashion design principles do provide examples for Architects to manipulate the skin as well as the structure of a building. The idea is not only limited to use in a new building, but also suitable for old buildings which need to be renovated in order to change the out-dated look to an up-to-date one. The three fashion techniques which I chose were the fundamental tools to carry out the experiment in this thesis. More complex and advanced systems could be added based on the fundamental design experiment . Moreover, a building can and will change eventually over time, as we should design it to be changeable rather than permanent. “A building is not something you finish. A building is something you start” (Brand).

Bibliography

Books, Cocoro. *Small House Tokyo: How the Japanese Live Well in Small Spaces*. Nashville: Dh Publishing, Inc., 2008. Print.

Chalayan, Hussein, and Caroline Evans. *Hussein Chalayan* . Rotterdam: NAi Publishers ;, 2005. Print.

Chang, Gary, Laurent Gutierrez, and Valérie Portefaix. *Suitcase house* . Hong Kong: Mccm Creations, 2004. Print.

Christman, Claudia B.;, and Margaret C. Kidwell. *Suiting Everyone: The Democratization of Clothing in America*. Washington D.C.: National Museum Of History And Technology, 1974. Print.

Clarke, Sarah E. Braddock, and Marie O'Mahony. *Techno Textiles 2: Revolutionary Fabrics for Fashion and Design*. New York: Thames & Hudson, 2008. Print.

Davidson, Cynthia C., and Stan Allen. *Tracing Eisenman: Peter Eisenman complete works*. New York: Rizzoli, 2006. Print.

Endo, Shuhei, and Hiroyuki Suzuki. *Shuhei Endo: paramodern architecture*. Milan: Electa Architecture, 2006. Print.

Fischer, Anette. *Basics fashion design 03: construction*. Lausanne: AVA Academia, 2009. Print.

Friedman, Mildred S., and Michael Sorkin. *Gehry talks: architecture + process*. New York: Rizzoli, 1999. Print.

Hodge, Brooke, Patricia Mears, and Susan Sidlauskas. *Skin + Bones: Parallel Practices in Fashion and Architecture*. New York: Thames & Hudson, 2006. Print.

Major, John S.. *Yeohlee - work: material architecture*. Mulgrave: Peleus Press, 2003. Print.

McQuaid, Matilda, and Shigeru Ban. *Shigeru Ban* . London: Phaidon Press, 2006. Print.

Mitchell, Louise. *The cutting edge: fashion from Japan ; [published in conjunction with the Exhibition The Cutting Edge: Fashion from Japan developed by the Powerhouse Museum, Sydney in association with the Kyoto Costume Institute, 27 September 2005 - 29 January 2006]*. Sydney: Powerhouse Publ., 2006. Print.

Miyake, Issei, Kazuko Sato, Raymond Meier, and Hervé Chandès. *Issey Miyake making things* . Paris: Fondation Cartier pour l'art contemporain ;, 1998. Print.

Quinn, Bradley. *Techno fashion* . Oxford: Berg, 2002. Print.

Stokstad, Marilyn. *Art History w/ CD (Revised Second Edition, Volume Two)*. 2nd ed. Alexandria, VA: Prentice Hall, 2004. Print.

Tortora, Phyllis G., and Keith Eubank. *Survey of Historic Costume 5th edition + Free Student Study Guide*. 5th ed. New York: Fairchild Pubns, 2010. Print.

Vysivoti, Sophia. *Folding Architecture 9th print*. Turnhout: Bis Publishers, 2008. Print.

Vysivoti, Sophia. *Supersurfaces 4th print*. Turnhout: Bis Publishers, 2008. Print.

Pictures:

Santa Caterina Market

Halbe, Roland. "EMBT Miralles Tagliabue Arquitectes Associats. Santa Caterina Market, Barcelona. ." 2005. JPG file.

Malagamba, Duccio . *Rehabilitation of Santa Caterina Market* . N.d. Rehabilitation of Santa Caterina

Market, Barcelona. *Architectural Record* 1 Feb. 2006: n. pag. Print

Raaij, Michiel. "Santa Caterina Market deconstruction/construction." 2008. JPG file.

Raaij, Michiel. "Santa Caterina Neighborhood." 2008. JPG file.

rory, rory. "Enric Miralles & Benedetta Tagliabue (EMBT)- Santa Caterina Market, 1997-2004." 2009. JPG file.

Taylorinc, chase. "Life on top: the story of a roof." 2009. JPG file.

Caixal Forum

Baan, Iwan. *CaixaForum Madrid*. N.d. Tate Modern, Madrid, Spain. *Transforming Tate Modern*. Web. 3 Feb. 2010.

Bacalis , Stratos . *Caixa Forum in Madrid, Spain by Herzog & De Meuron Architekten*. N.d. Architecture, Madrid. *Modern Furniture and Design Blog*. Web. 3 Feb. 2010.

Herzog & de Meuron. *Herzog & de Meuron CaixalForum Madrid*. N.d. arcspace, Madrid, Spain. *Herzog & de Meuron*. Web. 3 Feb. 2010.

Herzog & de Meuron. *Herzog & de Meuron CaixalForum Madrid*. N.d. arcspace, Madrid, Spain. Christian Richters. Web. 3 Feb. 2010.

15USW

Femia, Will. *15 Union Square West Uncovered!*. N.d. Curbed NY, New York. *Construction Watch*. Web. 6 Mar. 2010.

Joey. *Building interior design*. N.d. Curbed NY, New York. *15 Union Square West Revealed*. Web. 22 Mar. 2010.

Perkins Eastman Architects. "15 USW." 2010. JPG file.

UTS Tower

Battenbough , Gemma . *VIDEO: UTS tower to get glowing eco-skin*. N.d. Architecture and Design, Sydney, Australia. . Web. 19 Apr. 2010.

J Bar. *Ultimo UTS Tower*. N.d. Wikimedia Commons, Sydney, Australia. . Web. 19 Apr. 2010.

De Baljurk

Jong, Elly. *09-04-05 Baljurk Elly de Jong*. N.d. flickr, Nederland. . Web. 17 Apr. 2010.

Pvt pauline. *The Hague at the Kettingstraat, "De Baljurk"*. N.d. Wikimedia Commons, Den Haag. . Web. 6 Apr. 2010.

Schreurs, Gerrit. *De Baljurk Den Haag* . N.d. Architectuur in Nederland, Nederland. . Web. 17 Apr. 2010.